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GEOLOGICAL AND NATURAL HISTORY SURVEY OF CANADA.
ALFRED R. C. SELWYN, L.L.D., F.R.S., F.G.S., DIRECTOR.

MESOZOIC FOSSILS.

VOLUME I.

PART III.—On the Fossils of the Coal-Bearing Deposits of the Queen Charlotte Islands collected by Dr. G. M. Dawson in 1878,

—BY—

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The publication of the present report has been much delayed, first, by the removal of the Museum and Offices of the Survey from Montreal to Ottawa in 1881, next by the death of Mr. J. H. Balbirnie, who was to have lithographed the plates, in the spring of 1883, and lastly, by the resignation of the artist, Mr. A. H. Foord, which practically took place on the first of June, 1883.

Most of the text has been written and four of the plates have been printed off more than twelve months ago.

Plate 33 will be issued with Part 4, which is now in course of preparation, and which will complete the volume.

ALFRED R. C. SELWYN.

GEOLOGICAL AND NATURAL HISTORY SURVEY OFFICE,
Ottawa, March 25th, 1884.

MESOZOIC FOSSILS.

BY J. F. WHITEAVES.

VOLUME I.

III. On the Fossils of the Coal-Bearing deposits of the Queen Charlotte Islands collected by Dr. G. M. Dawson in 1878.

Introductory Remarks.

In 1872 Mr. James Richardson visited the Queen Charlotte Islands on behalf of the Geological Survey of Canada and spent a few days in the examination of the Coal mines at Cowgitz and of the geological structure of Skidegate Inlet. A description of his observations on this occasion will be found on pages 56-65 of the Report of Progress of the Survey for 1872-73. As pointed out in the first part of the present volume, in which the species were described and figured, the small series of fossils collected by Mr. Richardson from these coal-bearing deposits was scarcely sufficient to establish the exact geological horizon of the latter.

Six years later a much more extended geological and geographical exploration of the Queen Charlotte Islands was made by Dr. G. M. Dawson, who has since published a detailed account of the results of his explorations and of the conclusions arrived at therefrom in the "Report of Progress" of the Canadian Survey for 1878-79, to which the reader is referred for the fullest and latest information on the subject.

The following tabular view of the formations which have been recognized in these islands, in descending order, is condensed from that given on page 48 B of the volume just cited, with some slight additions and alterations suggested by Dr. Dawson.

24-3-'84.

FORMATIONS RECOGNIZED IN THE QUEEN CHARLOTTE ISLANDS.

POST PLIOCENE.

Unconformity, with evidence of some flexure and disturbance of Tertiary beds.

TERTIARY, probably MIOCENE.

Complete unconformity, with evidence of great disturbance. Chief period of mountain making.

CRETACEOUS.	A. Upper Shales and Sandstones	1,500	feet.
	B. Coarse Conglomerates	2,000	"
	C. Lower Shales and Sandstones, with coal	5,000	"
	D. Agglomerates	3,500	"
	E. Lower Sandstones	1,000 (?)	"
	Total	13,000	feet.

Unconformity, but without evidence of great disturbance.

TRIASSIC, with probably also some CARBONIFEROUS rocks.

Preliminary lists of the Post Pliocene, Tertiary, Triassic and Palæozoic fossils, prepared by the writer, are given in Dr. Dawson's report. By far the largest number of fossils collected by Dr. Dawson, however, consisting of upwards of one thousand specimens, are from the Newer Mesozoic strata of Skidegate and Cumshewa Inlets, which can now be shown to be of Cretaceous rather than of Jurassic age. An illustrated description of the various species obtained from these Cretaceous rocks will form the subject of the present memoir. As shewn on the geologically coloured map of the islands which accompanies Dr. Dawson's report, the Cretaceous rocks from which the fossils now to be described were obtained occur in the form of a belt averaging nearly fifteen miles in breadth, which crosses the centre of the group somewhat obliquely and which extends from Cumshewa and Skidegate Inlets, on the east side, to the west coast.

The fossils from the purely local divisions A to E, inclusive, of the Cretaceous rocks as given in the preceding tabular view of formations and in Dr. Dawson's report will be described separately in the following pages, in descending order, the localities for each species and the exact horizons from which they were collected being of course given on the authority of the collector.

DESCRIPTION OF SPECIES.

1.—From the "Upper Shales and Sandstones," or Sub-division A. of Dr. G. M. Dawson's Report.

Inoceramus problematicus, Schlotheim.

Ostracites labiatus, Schlotheim. —1813. Bronn's Jahrbuch, Vol. VII, p. 93. Teste Stoliczka.

Mytilites problematicus, Schlotheim —1820. Petrefactenkunde, Vol. I., p. 302.

Mytiloides labiatus, Bronginart. —1822. Cuvier's Ossemens Fossiles, pl. 3, fig. 4, in Geol. des Env. de Paris.

Inoceramus mytiloides, Mantell. —1822. Geology of Sussex, p. 215, pl. 27, fig. 2, and pl. 28, fig. 2.

" " Sowerby. —1823. Mineral Conchology, Vol. V., p. 62, pl. 442.

" " Goldfuss. —1836. Petrefactæ Germanicæ, Vol. II. p. 188, pl. 113, fig. 4.

Inoceramus problematicus, d'Orbigny.—1843. Paléontologie Française, Terr. Crét. Vol. III. p. 510, pl. 406.

" " Meek & Hayden.—1857. Proceedings of the Academy of Natural Sciences of Philadelphia, Vol. IX. p. 119.

" " Meek.—1876. Report on the Invertebrate Cretaceous and Tertiary Fossils of the Upper Missouri Country, p. 62, pl. 9, figs. 3*a–b*.

Inoceramus pseudomytiloides, Schiel, —1855. Pacific Railroad Reports, Vol. II. p. 108, pl. 3, fig. 8.

Skidegate Inlet, Shore between Slate Chuck Brook and Lina Island: five specimens. According to Dr. G. M. Dawson the typical locality of Subdivision A.

Point North of Lina Island, in Bear Skin Bay—three specimens. Dr. G. M. Dawson says: "This place is coloured as C on the map, but the beds are disturbed, and they may not actually belong to this subdivision. Their lithological character certainly resembles that of the Upper Shales, but this does not go for much."

The specimens collected by Mr. Richardson from the Upper Shales of Graham Island near Cowgitz, and mentioned on page 79 of this volume as being possibly referable to *I. concentricus*, are now known to belong to the present species.

In Great Britain and Europe *I. problematicus* is stated to occur in the Lower or Grey Chalk, the Turonien of d'Orbigny, and in the Upper

Green Sand or Cenomanien. In the United States it is said to be most frequently met with in the Niobrara Division, but it is also sometimes found in the Fort Benton Group.

2.—From the Coarse Conglomerates, or Subdivision B. of Dr. G. M. Dawson's Report.

The only fossil yet obtained from these conglomerates is a worn fragment of the guard of a Belemnite which it is impossible to determine specifically.

3.—From the Lower Shales and Sandstones, or Subdivision C. of Dr. G. M. Dawson's Report.

CEPHALOPODA.

Belemnites densus, Meek and Hayden.

Plate 22, fig. 1.

Belemnites densus, Meek & Hayden.—1858. Proceedings of the Academy of Natural Sciences of Philadelphia, p. 58, and do. for 1860, p. 418.
" " —1865. Palæontology of the Upper Missouri, p. 126, pl. 4, figs. 10 *a*, *b*, *c*, and Pl. 5, figs. 1 *d*, *e*, *f*, cæt. exclus.
" " Meek.—1876. Simpson's Report on Explorations across the Great Basin of Utah, Rep. on the Palæontological colections, p. 358, pl. 3, figs. 4 *a*, *b*.
Belemnites, Sp. Undt. —This volume, p. 11, woodcut fig. 1, and pl. 1, figs. 1, 1*a*, 1*b* and 1*c*.

Guard comparatively short and thick, increasing rapidly in breadth from the point to a distance of about one-half or three-quarters of an

inch and then becoming subcylindrical and of nearly uniform thickness. Apices of guard and phragmocone eccentric and placed nearest to the siphonal side. Alveolar cavity occuping much more than one-half of the entire guard: outline of transverse section at the thickest end nearly circular, but a little flattened at the sides.

Length of the only specimen collected, sixty millimetres; maximum breadth of the same, at the larger end and from the siphonal to the antisiphonal side, twenty-one and a-half millimetres.

"Coal locality, South side of Skidegate Channel, from base of Subdivision C." Dr. G. M. Dawson. One distorted, imperfect, and badly preserved example.

In the Queen Charlotte Islands, as in the Black Hills of Dakota, the few and imperfect guards of Belemnites which have yet been collected appear to be readily separable into two sets, viz., into those which are short and comparatively thick, and into those which are long and comparatively slender. The Skidegate representatives of the former set seem to correspond fairly well with the typical form of *B. densus* from Dakota, while specimens of the latter set from the same locality agree perfectly with slender individuals from the Black Hills which have been described as a variety of that species, but which Mr. Meek thinks may be probably distinct and to which therefore it has here been thought convenient to apply a provisional name.

The apices of the specimen described above and of the one collected by Mr. Richardson in 1872 are no doubt rather more abruptly pointed than are those of some of the types of *B. densus* from Dakota as here restricted, but no other appreciable difference can be detected between them. Moreover, the Utah specimen of *B. densus* figured by Meek is quite as abruptly pointed as the one from Skidegate Inlet represented on Plate 22. The guard of the specimen collected by Mr. Richardson and described on pages 11 and 12 of the present volume has a faint apical groove on the siphonal and presumably ventral side, but the one obtained by Dr. Dawson, which is larger as well as proportionally shorter and thicker, has no apical groove.

Belemnites Skidegatensis. (Nom. Prov.)

Plate 22, figs. 2, 2 *a*, 2 *b* and 2 *c*.

Belemnites densus, Meek & Hayden.—"Slender variety." Palæontology of the Upper Missouri, p. 5, figs. 1*a*, *b*, *c*, only.

Guard rather long and slender, increasing very gradually in thickness from the point upwards: outline of transverse section at the

largest end nearly circular, but compressed slightly and somewhat obliquely at the sides. Alveolar cavity occupying about one half of the entire length in average specimens: chambers in the phragmocone very numerous and approximated: apices of both guard and phragmocone eccentric and placed nearest to the siphonal side. Apex of guard in some specimens with, and in others without, a narrow faint groove on the siphonal side.

Length of the most perfect specimen collected: seven and a half centimetres; diameter of the same, from the siphonal to the antisiphonal side, at the largest end, fourteen millimetres.

Skidegate Inlet, East side of Alliford Bay, three specimens; also South side of same bay, four specimens; all from rocks which Dr. Dawson regards as near the base of Subdivision C.

On page 127 of the "Palæontology of the Upper Missouri," after describing the typical form of *Belemnites densus*, and discussing its probable affinities, the following remarks are added by Mr. Meek:— "Along with these large specimens" (of *B. densus*) "we find several smaller ones, having a proportionally more slender form and a more nearly central axial line. Some of these also have a quite distinct, though narrow, ventral groove, while their transverse section varies from subcircular to oblong-oval. These, we suspect, belong to a distinct species, but, without better and more extensive collections for comparison, we have not been quite able to satisfy ourselves that they may not be younger individuals of the more robust form. These two varieties appear to bear exactly the same relations that the large and small specimens of *B. Panderianus*, figured by d'Orbigny, do to each other." In the "explanations of plate V." of the same volume, Mr. Meek goes a little farther than this, and adds a statement to the effect that the slender Belemnite from Dakota, represented by figures 1*h* and 1*i* of that plate, which has "a distinct ventral furrow," may possibly belong to a different species to those from the same locality, which are equally slender but which have no ventral furrow.

The seven specimens collected by Dr. G. M. Dawson at Skidegate Inlet, and to which the name *B. Skidegatensis* has been provisionally applied, have no distinct median ventral furrow, but only a faint apical groove on the siphonal and therefore possibly ventral side.

It is worthy of note that the short and thick form of the *Belemnites Panderianus* of D'Orbigny, to which Eichwald has given the name *B. curtus*, and which Meek thought that *B. densus* was intimately related to, is regarded by Eichwald in the "Lethaea Rossica"* as a Neocomian rather than a Jurassic species.

* Volume 2, page 100.

In addition to the guards already described, three large and detached phragmocones of Belemnites, or portions of phragmocones, were collected by Dr. G. M. Dawson, on the south side of Alliford Bay, and one on the north shore of Cumshewa Inlet. The most perfect of these is about three inches in length by one inch and three quarters in diameter at the larger end, and one inch at the smaller. These specimens may have formed part of very large individuals of *B. densus*, but they do not possess any characters by which they can be identified.

Nautilus Suciensis, Whiteaves.

Plate 21.

Nautilus, Sp. Undt.

Nautilus Suciensis, Whiteaves. —This volume, page 14. Ib., page 97, plate 11, figs. 1 and 1a.

Six large ribbed Nautili which are specifically identical with the fine specimen of a *Nautilus* obtained by Mr. Richardson in 1872 and described on pages 14 and 15 of the present volume, were collected by Dr. G. M. Dawson at two localities in Skidegate Inlet. On examination and comparison, these specimens appear to represent only a rather finely ribbed and stratigraphical as well as local variety of the *N. Suciensis* from the Sucia Islands, a species which was based on one nearly entire but comparatively small specimen with the nacreous layer of the test only preserved, and a fragment of the cast of a much larger individual. The following is an amended description of the Queen Charlotte Island variety of the species:—

Shell large (the maximum diameter of the largest specimen being fully seven inches) inflated, subglobose but always depressed in the centre of the umbilical region, periphery broadly rounded, sometimes flattened or even slightly concave in the middle. Inner whorls completely covered by the last volution, umbilicus closed or nearly so when the test is preserved, its place being occupied by a narrow but somewhat deep depression or pit,—small and funnel-shaped in the cast. Aperture subcircular, (or in some specimens almost subquadrate) and rather deeply emarginated by the encroachment of the preceding volution. Surface of the outer whorl marked by numerous (about sixty) flattened, radiating ribs, which curve boldly forwards over the outer half of the sides and backwards on the periphery, upon which latter each rib forms a moderately deep but scarcely angular sinus. Test thick.

Septa approximated, from twenty to twenty-two in the whorl nearest to the aperture: margins of the septa, as seen on the cast, slightly flexuous, gently convex next the umbilical perforation, concave on and towards the outer half of the sides, and straight or slightly convex on the periphery. Siphuncle nearly central, but placed a little on the inner side of the centre of each septum.

Exact localities: Skidegate Inlet one mile and three-quarters southwest of Welcome Point, and Bay east of Alliford Bay.

Genus SPIROCERAS, Meek.

Report on the Invertebrate Cretaceous and Tertiary Fossils of the Upper Missouri Country. Washington, 1876. Pages 485 and 486.

Shell somewhat resembling that of *Helicoceras*, as typified by *H. annulatum*, d'Orbigny, but differing therefrom in "its more closely coiled volutions, more produced spire and particularly in consequence of having the costæ that cross its siphonal side, with nodes placed between them, so as to form three longitudinal rows along this outer surface." "It is also much larger and more robust than d'Orbigny's types of *Helicoceras*." Type of the genus, *Turrilites Robertianus*, d'Orbigny.*

SPIROCERAS CARLOTTENSE. (N. Sp.)

Shell apparently either sinistral or dextral, large, the largest fragment known, which consists of nearly the whole of one volution, being at least six inches in diameter. Cavity in the centre of the whorls, which corresponds to the umbilical perforation, equal to about one-third of the entire breadth of the base: outline of aperture nearly circular. Outer surface of the later whorls marked by transverse rows of broad, low, rounded tubercles or nodes, which alternate with two simple ribs. In each of the transverse rows there are four tubercles or nodes, one above and three below the siphuncle. The simple ribs which alternate in pairs with each row of nodes are transverse also, but they curve back slightly in passing over the siphuncle. In a fragment which probably belongs to this species and which consists of portions of two of the earlier whorls, the rows of tubercles are represented by rows of conical spines, which latter are about two lines in height. Septum unknown.

North shore of Cumshewa Inlet: two large septate fragments, each consisting of nearly an entire whorl, but both so badly water worn

* Paléontologie Française. Terrains Crétacés, vol. 1, page 585. Atlas, plate 142.

that most of the finer details of their sculpture and septation are obliterated, and which therefore are not figured.

The earlier whorls of what appears to have been a young individual of the same species are partly shewn in a much smaller specimen from the same locality, which has much the appearance of a small *Turrilites*, except that its volutions are not in contact. The specimen consists of a nodule of argillaceous limestone, so broken as to expose one entire but exfoliated whorl, with the impression of the lower half (or more) of the one which preceded it. The larger of these two whorls shews no remains of either tubercles or spines, but the mould of the basal portion of the upper and smaller whorls exhibits the impressions of four transverse rows of spines, with three spines in each row. As all the remains of spines that happen to be visible in this specimen are placed apparently below the siphuncle, and as the larger examples shew three tubercles below the siphuncle and one above it, in each transverse row, it seems probable that in the earlier whorls there was originally one spine in each transverse row, above the siphuncle, as well as three spines in each row below it.

The specimens for which the above name is proposed are similar in many respects to the European type of the genus, but on the whole seem to be sufficiently distinct to warrant their separation. On the later volutions of the present species there appear to be invariably four tubercles or nodes in each transverse row and its earlier whorls were probably spinose, whereas in the later whorls of the European *Turrilites Robertianus* there are only three tubercles in each transverse row, and its earlier volutions are represented as marked by similar tubercles, though of course by much smaller ones.

Ammonites (Auctorum.)

The above name being now generally and as it would seem properly restricted to the three-keeled group of shells of which *Ammonites bisulcatus* of Bruguière is the type, can no longer be applied with propriety to any Cretaceous species.

One of the most satisfactory as well as one of the most recent attempts at a re-classification of the great order *Ammonea* of Lamarck is the one published by Dr. Paul Fischer in the first volume of his "Manuel de Conchyliologie,"* whose nomenclature and arrangement will be adopted, with one or two unimportant exceptions, in the following descriptions of the various species of Ammonites collected by Dr. G. M. Dawson at the Queen Charlotte Islands.

* Paris, 1881.

(*Amaltheidæ.*)

SCHLOENBACHIA INFLATA, Sowerby. (Sp.)

Ammonites inflatus, Sowerby. —1817. Mineral Conchology pl. 178.
" *rostratus*, Sowerby. —1817. " . " pl. 173.

For the full synonymy of this species, which is too long to insert here, see Pictet & Campiche's Paléontologie Suisse, "Description des Fossiles du Terrain Crétacé des Environs de Sainte Croix," Première Partie, pages 178 and 179.

Bear Skin Bay, Skidegate Inlet: a well preserved and very characteristic cast, which, however, does not shew the septation.

The specimen measures five inches and three-quarters in its greatest diameter and the maximum width of its umbilicus is two inches and a quarter. Its volutions are somewhat squared, and the outer whorl is ornamented by twenty-one large, widely distant and nodulous ribs, which are interrupted or cut through, on the centre of the periphery, by a simple, narrowly rounded and moderately prominent keel. The ribs are mostly simple but occasionally they bifurcate, and on the inner or posterior half of the outer volution they bear four tubercles or nodules on each side of the keeled periphery. On the outer or anterior half of the same volution and especially near the aperture the ribs bear only three tubercles on each side of the periphery, the two inner ones being nearly obsolete, while the outer one rises to a height of fully ten millimetres.

SPHENODISCUS MAUDENSIS. (N. Sp.)

Plate 22, figs. 3, 3*a*, and 3*b*.

Shell compressed lenticular: periphery minutely and inconspicuously carinated, the keel being simple, entire, very narrowly rounded, and with parallel sides: inner whorls almost entirely concealed: umbilicus small, about one-tenth of the greatest diameter, with nearly vertical

sides and a subangular margin. Aperture narrowly sagittate or lanceolate with a basal truncation, deeply emarginated by the preceding volution, outside of which emargination its height is more than twice its maximum breadth. Surface smooth. Septum consisting of six lobes and six saddles on each side, not counting the minute siphonal saddle. Siphonal lobe about equal in height to the first lateral, and composed of two main branches (one on either side of the siphuncle), each of which is trilobate at is outer extremity. First lateral lobe scarcely branched, but bearing three minute, irregular toothed lobules, one on each side. Between the siphonal lobe and the first lateral, there is an auxiliary lobe about equal in height to the second lateral. The remaining lobes are simple but minutely incised and decrease gradually in size and height towards the umbilical margin. Siphonal saddle unknown, but obviously very small. First lateral saddle much larger than any of the rest, deeply divided into two spreading branches, which are variously and unsymmetrically lobed and incised. Second lateral saddle somewhat deeply lobed and cut at its outer extremity, but not distinctly branched. The remaining saddles, like the corresponding lobes, are simple but minutely toothed, and decrease regularly in size towards the umbilical margin. Greatest diameter, rather more than forty-nine millimetres: width of umbilicus, four and a-quarter mm.: maximum thickness, eight and a half-mm.

East point of Maud Island, in Skidegate Inlet: one imperfect example.

This shell is very nearly related to the *Ammonites Requienianus** and the *A. Goupilianus*† of d'Orbigny, especially in the character of its septum. From the former, however, it differs in the minute and obtuse carination of its periphery, and from the latter by its much smaller umbilicus.

The septation of *S. Maudensis* is not at all like that of the typical species of *Sphenodiscus*, but the author of that genus is inclined to think that its characters should be enlarged so as to include such forms as *A. Requienianus*. In this connection also, Dr. Fischer writes as follows‡: "Le type de ce genre" (*Sphenodiscus*) "est l'A. *lobatus*, Tuomey. Le groupe des *Clypeiformes* de d'Orbigny (type: *A. Goupilianus* d'Orbigny) correspond assez bien à la coupe générique proposée par Meek."

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* Paléontologie Française, Terrains Crétacés. Tome 1, p. 315. Atlas, pl. 93.

† " " " " p. 317. Atlas, pl. 94, figs. 1–3.

‡ Manuel de Conchyliologie. Paris, 1881. Vol. I., p. 389.

(*Lytoceratidæ.*)

Lytoceras Batesi, Trask. (Sp.)

Plate 27, fig. 1.

Ammonites Batesii, Trask.	—1855. Proceedings of the California Academy of Sciences, p. 40.
" " Gabb.	—1864. Geological Survey of California Palæontology, Vol. I., p. 67, pl. 13, figs. 16 and 16*a–b*.
" " Gabb.	—1869. Idem., Vol. II., p. 132, pl. 20, fig. 9*a*, and pl. 21, fig. 10*a–b*.
Ammonites crenocostatus, Whiteaves.	—This volume, p. 45, pl. 9, figs. 2 and 2*a*.

Bear Skin Bay, Skidegate Inlet: a well preserved but somewhat imperfect specimen, whose maximum diameter is four inches and three-quarters.

A re-examination of the small Ammonite to which the provisional name of *A. crenocostatus* was given on page 45 of the present volume and which was there stated to be "perhaps a half-grown specimen of *Lytoceras Liebigi*, Oppel," has convinced the writer that it is only a young specimen of the *Ammonites Batesi* of Trask, in a somewhat peculiar state of preservation. The sculpture of *A. Batesi*, which is a very typical species of *Lytoceras*, is thus described by Mr. Gabb on page 67 of the first volume of the "Palæontology of California." "Surface marked by numerous fine, rather sharp, elevated ribs, crossing from the interior of the umbilicus obliquely forwards over the dorsum. In some specimens the interspaces are marked by fine revolving lines. In others these lines are absent."

The sculpture of the type of *A. crenocostatus*, upon which the species was mainly based, at first sight appears to consist of rather distant, minutely crenate, transverse raised lines, placed upon the convex surface of the shell, but upon closer examination it is found that these crenulations are caused by minute and underlying revolving striæ, which can only be seen in a certain light.

According to Mr. Gabb,* *A. Batesi* is "the largest known, most widely diffused, and one of the most variable Ammonites" of the Shasta Group; or "older beds" of the Cretaceous formation in California, where it attains to a size of more than a foot in diameter. The same species seems to have also attained to a considerable size at the Queen Charlotte Islands, for in a septate fragment collected by Mr. Richardson in 1872 at Skidegate Inlet, west of Alliford Bay, which cannot be distinguished from *A. Batesi*, the height of the aperture alone is fully

* Palæontology of California. Vol. II., p. 132.

five inches. In this fragment there is no trace of any emargination of the inner surface of the volution, so that the outer whorls of large individuals, though closely contiguous, were probably not embracing.

Lytoceras Sacya, Forbes. (Sp.)

Plate 25.

Ammonites Sacya, Forbes.	—1846. Transactions of the Geological Society of London, Vol. VII. p. 113, pl. 14, fig. 10.
" *Buddha*, Forbes.	—1846. Idem,, Vol. VII. p. 112, pl. 14. fiig. 9.
" *Sacya*, d'Orbigny.	—1850. Prodrome de Paléontologie, Vol. II., p. 213.
" *Sacya*, Giebel.	—1852. Fauna der Vorwelt, Vol. III., p. 557 and 559.
" *Sacya*, Stoliczka.	—1865. Palæontologia Indica, Cretaceous Fauna of S. India, Vol. I., p. 154, pl. 75, figs. 5–7, and pl. 76.
Ammonites filicinctus, Whiteaves.	—1876. This volume, p. 43, pl. 2, figs. 2.

North shore of Cumshewa Inlet, eighteen specimens and some fragments: also Skidgate Inlet, one specimen from each of the following localities, viz., Shingle Bay; east side of Shingle Point; Shore one mile and three quarters south-west of Welcome Point; and Bay east of Alliford Bay.

The largest specimen yet collected at the Queen Charlotte Islands is six inches in its greatest diameter. The reason for regarding *A. filicinctus* as a mere synonym of *A. Sacya*, Forbes, will be found stated in a foot note to page 104 of the present volume, and this conclusion is fully sustained by the much larger and in some respects better series of specimens since collected by Dr. G. M. Dawson.

Lytoceras Timotheanum, Mayor. (Sp.)

Ammonites Timotheanus, Mayor.	—1847. Pictet et Roux. Mollusques des Grès Verts, p. 39, pl. 2, fig. 6, and pl. 3, figs. 1, 2.
" *Jurinianus*, Pictet.	—1847. Idem, p. 41, pl. 3, fig. 3.
" *Timotheanus*, d'Obigny.	—1850. Prodrome de Paléontologie Tome 2, p. 124.
" " Pictet.	—1860. Paléontologie Suisse, Fossiles de Ste. Croix, Vol. I, p. 289.
" " Stoliczka.	—1865. Palæontologia Indica. Cretaceous Cephalopoda of Southern India, p. 146, pl. 73, figs. 3–6.
" " Whiteaves.	—1876. This volume, p. 41, pl. 3, figs. 2 and 2*a*.

South Island, five specimens: Bear Skin Bay, Skidegate Inlet, two

specimens: North shore of Cumshewa Inlet, one fine and nearly perfect example, whose maximum diameter is three inches.

(*Harpoceratidæ.*)

HAPLOCERAS PEREZIANUM, Whiteaves.

Ammonites Perezianus, Whiteaves. —1876. This volume, page 19, pl. 2, figs. 1 and 1*a*.
Not *Ammonites Perezianus*, D'Orbigny.—1850. Prodrome de Paléontologie, p. 99.

South Island, Skidegate Channel: two tolerably perfect and typical specimens and two fragments. North shore of Cumshewa Inlet, one example.

In the collection there are also two specimens from South Island which may be referable to this species. The largest of these, whose greatest diameter is fifty seven millimetres, differs from the typical form of *H. Perezianum*, as does the smaller one, in having a more abruptly rounded umbilical margin, and in the greater prominence of the flexuous undulations or plications on the sides, which (plications) frequently bifurcate at a distance about half-way between the umbilical margin and the periphery. These two specimens have evidently very close affinities with the *Ammonites bicurvatus* of Michelin, as figured by d'Orbigny on plate 84, figure 3, of the "Terrains Crétacés," though in the French species the inner face of the whorls is represented as squarely truncated and the umbilical margin as acutely angular.

A. Perezianus, nobis, (*non* d'Orbigny) was originally supposed to be an *Oppelia* nearly related to *O. subcostaria*, Oppel, and *O. Waageni*, Zittel. The specimens obtained by Dr. Dawson, however, seem to show that it is rather an *Haploceras* of the type of *A. bicurvatus*, Michelin, and of *A. Cleon*, d'Orbigny.

As the *Ammonites Perezianus* of d'Orbigny, from the Neocomian of the "departement du Var, de Nice, d'Espagne, etc.," clearly belongs to the genus *Olcostephanus* of Neumayr, there will be no necessity for any change in the name of the present species.

Haploceras Beudanti, Brongniart.

Plate 26, figs. 1 and 1*a*.

Ammonites Beudanti, Alex. Brongniart.—1822. In Cuvier's Environs de Paris, pp. 95, 99, pl. 7, fig. 2.

" " d'Orbigny. 1840. Paléontologie Française, Terrains Crétacés, Vol. I., p. 278, pl. 33, figs. 1–3, and plate 34.

" " Pictet. 1860. Paléontologie Suisse., Fossiles de Ste Croix, Vol. I., p. 277, pl. 40. With references to other authors.

" " Stoliczka. —1865. Palæontologia Indica., Cretaceous Cephalopoda of Southern India, Vol. I. p. 142, pl. 71, figs. 1–4, and pl. 72.

" " Eichwald. —1868. Lethaea Rossica, Vol. II., sec. 2, p. 1142.

Form **A.**—Umbilical margin rectangular.

Bear Skin Bay, Skidegate Inlet: five specimens, one measuring about three inches and three-quarters, and the others varying from an inch and a-quarter to an inch and three-quarters in their greatest diameter.

Form **B.**—Umbilical margin broadly rounded.

North shore of Cumshewa Inlet: upwards of ninety specimens, most of which are well preserved and nearly perfect, though the outer lip is never entire, and which vary from one inch and a-half to five inches and three-quarters in their maximum diameter.

Brongniart's original description of *A. Beudanti* is not accessible to the writer, but Pictet and Eichwald both agree in stating that its umbilical margin is rectangular. Pictet in particular is very explicit on this point, as may be seen by the following extract from his remarks on the affinities of that species in the first volume of the Paléontologie Suisse:—" Le caractère le plus fixe et le meilleur, dans notre opinion, est le forme même des bords de cet ombilic. Dans l'A. Beudanti les tours sont plats et ne s'infléchissent pas en dedans. L'ombilic est bordé, comme nous l'avons dit, par une muraille verticale dont le sommet est une carène rectangulaire."*

On the other hand, in most of d'Orbigny's and Stoliczka's figures of

* Paléontologie Suisse. Fossiles du Terrain Crétacés des environs de Sainte Croix. Geneva, 1858–60. Vol. I., p. 279.

A. Beudanti the umbilical margin is represented as rounded more or less broadly, and in the text which corresponds to these figures the same part of the shell is nowhere stated to be angulated or carinated.

It would thus appear that there are two forms of the species—one, which may be the most typical and which for convenience has been called Form A, in which the inner face of the sides is squarely truncated, especially in the outer whorl, so that the umbilical margin is rectangular; and the other, or Form B, in which the sides of the outer whorl slope convexly down to the suture, and in which therefore the umbilical margin is rounded.

The specimens from Bear Skin Bay, in Skidegate Inlet, which have already been referred to Form A, correspond perfectly with Pictet's figures of *A. Beudanti* on plate 90 of the first volume of the "Paléontologie Suisse."

All the specimens of this species from Cumshewa Inlet have the umbilical margin rounded, and are therefore referred to Form B. They agree very well in form with most of d'Orbigny's figures of *A. Beudanti*, especially with figures 1 of plates 33 and 34 of the Atlas to the first volume of the "Paléontologie Française, Terrains Crétacés."

The Cumshewa variety of *A. Beudanti* occurs in great abundance in large nodules of argillite. The test is beautifully preserved in these nodules, but it adheres so tenaciously to the matrix that it is almost invariably detached from the cast when the nodules are split open. The cast is marked by distant, very flexuous and obliquely transverse constrictions or periodic arrests of growth. In the specimen figured on plate 26, whose greatest diameter is about five inches and a-half, there are twelve of these flexuous constrictions on the outer whorl, each of which consists of a narrow but rather deep groove, which is sometimes partly margined by a rib-like elevation, especially on the inner side of the groove and near the periphery,—and sometimes not. Small portions of the test sometimes adhere to the cast, and such specimens show that the outer surface of the test is faintly and rather closely ribbed. The ribs are flexuous and run parallel to the distant constrictions on the cast. Near the aperture of the specimen figured, the ribs on a small piece of the shell which happens to be preserved are rather more than one millimetre broad, but a little less than two mm.

At Cumshewa Inlet also a cast of a very large species of *Haploceras* was collected by Dr. Dawson, which is probably a variety of Form B. of *H. Beudanti*. The dimensions of this specimen are as follows:—maximum diameter, twenty-two inches; breadth of aperture and consequently greatest lateral diameter of the shell, eight inches; width of umbilicus, nearly seven inches. The umbilicus has steep walls, but its margin is rather rounded than angular. The outer volution is marked

by about twenty oblique but nearly straight, narrow and widely distant, simple raised ribs, which are more or less acute and which become obsolete upon the periphery. As measured in the centre of one of the sides of the last whorl, these ribs are one inch and a-half apart at the commencement of the volution and two inches and a-half apart at the aperture. A small fragment of the test which remains on the periphery shows that the outer surface of the shell is marked by extremely obscure and rather fine ribs, which average about one line in breadth near the aperture.

According to Stoliczka,* "*Ammonites Beudanti* is, in Europe, characteristic of the Gault, especially of its middle strata; it is known from many localities in France, Switzerland, Germany, England and Russia; and also from the province of Constantine in Algeria." In Southern India it occurs of great size at Odium, Mooraviatoor and Pondicherry, and, as has been already stated, it is by far the most abundant of all the Ammonites collected by Dr. G. M. Dawson at the Queen Charlotte Islands.

Haploceras planulatum, Sowerby. (Sp.)

Plate 28, fig. 1.

Ammonites planulatus, Sowerby.	—1827. Mineral Conchology, Vol. VI., p. 136, pl. 570, fig. 5. (*Not* A. planulatus, Schlotheim.)
Ammonites Mayorianus. d'Orbigny.	—1884. Paléontologie Française, Terrains Crétacés, Vol. I., p. 267, pl. 79.
" *Gaudama*, Forbes.	—1846. Transactions of the Geological Society of London, Vol. VII., p. 113, pl. 10, fig. 3.
Ammonites Mayorianus, Pictet & Roux.	—1848. Fossiles des Grès Verts, p. 37, pl. 2, fig. 5.
" *Griffithii*, Sharpe.	—1854. Fossil Cephalopoda of the Chalk, p. 28, pl. 11, fig. 3.
" *planulatus*, Sharpe.	—1854. Idem., p. 29, pl. 12, figs. 3–4.
" *Mayorianus*, Pictet.	—1860. Paléontologie Suisse, Fossiles de Ste. Croix, p. 283
" *planulatus*, Stoliczka.	—1865. Palæontologia Indica. Cretaceous Cephalopoda of Southern India, Vol. I. p. 134, pls. 67 and 68

North shore of Cumshewa Inlet: one small specimen about three inches and a-quarter in diameter, and two large ones, one ten inches and the other fully eleven inches in their greatest diameter.

* Palæont Indica. Cret. Ceph. of S. India, p. 143.

Stoliczka says "the obsoleteness of the ribs towards the umbilicus" is "generally very constant in this species,"* and Pictet describes the ribs as becoming narrow on the inner half of the sides and as disappearing "vers la moitié des flancs."† In the smallest specimen from Cumshewa Inlet, the original of figure 1 on Plate 28, the ribs are as strongly marked on the umbilical margin as they are on the periphery, though this remark will not apply to the two large specimens from the same locality.

The geographical distribution of *Haploceras planulatum* is very extensive. In the "Palæontologia Indica" it is stated to occur in the Chalk Marl and Upper Greensand of England, in the Gault and "Grès Verts" of France, Savoy and Switzerland, and "it maintains the same geological horizon of the Middle Cretaceous" in Germany, Hungary and the Carpathians. It has also been recognized in the Cretaceous rocks of the Andes of Venezuela, in strata of the same age at Daghestan, as well as from many localities in Southern India.‡

Haploceras Cumshewaense. (N. Sp.)

Plate 24, fig. 1.

Shell composed of few (probably of three or four) strongly compressed whorls, which increase somewhat rapidly in size: periphery narrowly rounded: umbilical margin abruptly truncated at nearly a right angle to the sides: umbilicus about one-fourth the entire diameter and exposing one-half of the sides of the inner whorls. Aperture semi-elliptical, nearly twice as high as broad, squarely truncated at the base and deeply emarginated by the preceding volution.

Surface of the outer whorl marked in the cast by obliquely transverse, flexuous ribs, which are dichotomous, bi-dichotomous, or trifurcating, but rarely simple, also by distant flexuous grooves or periodic arrests of growth, which run parallel to the ribs and which can scarcely be distinguished from the furrows which alternate with each rib except by their being a little broader and deeper. On the last whorl of the only specimen collected there would appear to have been about twelve of these obscurely defined arrests of growth, and the ribs, which are acute and somewhat crowded, are not quite two millimetres apart on the periphery near the aperture.

North shore of Cumshewa Inlet: a single fragment.

This shell may be only a variety of the *Ammonites Brewerii* of Gabb,

* Palæontologia Indica, Fossil Cephalopoda of Southern India, p. 135.
† Paléontologie Suisse, Fossiles de Ste. Croix, Vol. I, p. 284.
‡ Palæontologia Indica, Fossil Cephalopoda of Southern India, pp, 136–137.

which is known to occur at Skidegate Inlet, but its sculpture appears to be quite different. The surface of *A. Brewerii* is described as "variable from nearly smooth, or marked only by sinuous striæ, to strongly costate. the striæ assuming the character of irregular ribs, most marked on or near the dorsum,"* and the ribs of the costate variety figured by Mr. Gabb are invariably represented as simple.

Haploceras Cumshewaense appears also to be nearly related to the *Ammonites Kandi* of Stoliczka, † which Neumayr says is an *Olcostephanus*, ‡ but in the latter species there are said to be only five periodic arrests of growth in the outer whorl.

(Section A.—*Normales.*)

STEPHANOCERATIDÆ.

The sutural line, the comparative size of the chamber of habitation and the shape of the outer lip being unknown in all the specimens collected of each of the four following species, it is difficult to allocate the latter satisfactorily into their proper genera. From the additional evidence afforded by the specimens collected by Dr. Dawson it would however appear that the shells described on pages 29–32 of the present volume with doubt as "Form A." and "Form B." of *Ammonites Loganianus*, are probably two distinct species of *Stephanoceras*, although Drs. Neumayr and Fischer both regard that genus as confined exclusively to rocks of Jurassic Age. The *Ammonites Skidegatensis* described on pages 34–37 of this volume, seems to be a true *Perisphinctes*, as originally supposed, although in its earliest stages it looks more like a species of *Olcostephanus*. The type of *A. Loganianus*§ on the other hand, proves to be a distorted example of an *Olcostephanus* (Neumayr) allied to *A. Astierianus* d'Orbigny, which latter shell is regarded as the type of his genus, although its ribs are *not* interrupted on the periphery.

STEPHANOCERAS OBLATUM. (N. Sp).

Ammonites Loganianus, Whiteaves. Form **A**. This volume, p. 29, pl. 4, figs. 2 and 2*a*.

This shell can no longer be regarded a variety of *A. Loganianus*,

* Palæontology of California. Vol. II., p. 130.
† Palæontologia Indica. Cret. Ceph. S. India, p. 140, pl. 70, figs. 4 and 5*a*.
‡ Sitzb. der k. Akad. des Wissensch, 1875, Band 71, p. 41.
§ This volume p. 7, pl. 8, fig. 2.

which, as already pointed out, is an *Olcostephanus*, but as a distinct species of *Stephanoceras* remarkable, as is the next also, for its very close resemblance to some of the Jurassic *Macrocephali*. It can at once be distinguished from the type of *Olcostephanus Loganianus*, as the latter species is now understood, by its smaller size, its narrow umbilicus caused by the much closer enrolment of the whorls, by the almost complete envelopment of the inner volutions and more especially by the broad and deep constriction of the outer whorl immediately behind the aperture.

A perfect specimen of *S. oblatum*, which differs from the original of the figures on plate 4 of the present volume only in being a little smaller, was purchased by Dr. G. M. Dawson from Indians, who stated that it was found in Skidegate Inlet.

Stephanoceras cepoides. (N. Sp.)

Ammonites Loganianus, Whiteaves. Form **B**. This volume, p. 30, pl. 8. figs. 1 and 1*a*.

South Island, Skidegate Inlet: a small but well preserved specimen, whose maximum diameter is about twenty-five millimetres.

This species also seems to differ both generically and specifically from the *Olcostephanus Loganianus* as now restricted. It (the *O. cepoides*) may be at once recognized by its nearly globose form, by the close enrolment of its whorls and consequently narrow umbilicus, also by its sculpture which consists of non-tuberculated and bifurcating primary costæ, which alternate with simple secondary ribs. The analogies between this shell and young specimens of *Ammonites Gervillei*, Sowerby, which is likewise a *Stephanoceras*, have been pointed out on page 31 of the present volume.

Perisphinctes Skidegatensis, Whiteaves.

Ammonites Skidegatensis, Whiteaves. —This volume, p. 34, pl. 7 and pl. 9, fig. 1.

East end of Maud Island: a small but characteristic fragment. An exquisitely perfect specimen of this shell, which measures two inches and a-half in its greatest diameter and which is said to have been collected in Skidgate Inlet, was purchased from Indians by Dr. G. M. Dawson.

Olcostephanus Loganianus, Whiteaves.

Plate 23, figs. 1 and 1*a*.

Ammonites Loganianus, Whiteaves. Type.—This volume, p. 27, pl. 8, fig. 2.
Stephanoceras Humphreysianum, Hyatt. —Geological Survey of Canada, Report of Progress, 1876-77, p. 156: but not *Ammonites Humphreysianus*, Sowerby.

South side of Alliford Bay, in Skidegate Inlet: four well preserved but imperfect specimens.

The type of *Ammonites Loganianus* is a badly distorted cast, which gave a very incorrect idea of the number of the volutions of the shell, of the true amount of their involution, and consequently of the proportionate width of the umbilicus. A nearly perfect specimen of this species has since been collected by Dr. G. M. Dawson, at Sigutlat Lake, B.C., which is figured on plate 23, and this, together with the specimens from Alliford Bay, enable the description of its characters given on pages 27–29 of the present volume to be amended as follows:

When perfect and undistorted, the shell appears to have been composed of about five rounded volutions, which are so lightly enrolled that more than one-half of the sides of the inner ones are exposed. In some specimens the outer whorl is somewhat compressed on the periphery, and in others the sides are slightly compressed. The umbilicus is broad and open, but its margin is indistinctly defined. A row of tubercles on the last volution, from which the primary ribs trifurcate, appears to represent its outer boundary, and assuming this to be the case, then the maximum width of the umbilicus is equal to fully two-thirds of the entire diameter. The aperture is usually, though not always, broader than high, transversely reniform or subcrescentic in outline, and shallowly as well as concavely emarginated at its base by the encroachment of the preceding whorl. The surface is regularly ribbed, and the costation consists of primary trifurcating ribs, with one or two secondary ribs intercalated between each pair of primaries. On the outer whorl the primary ribs commence at the suture and extend nearly half-way across the sides to the outer boundary of the umbilicus, as simple, broad, and distant costæ; then at the umbilical margin each primary rib trifurcates from a transversely elongated and rather prominent tubercle before passing over the periphery. On the same volution the secondary ribs are confined to the outer half of the sides. From this disposition of the ribs it follows that there are usually four or five times as many on the periphery as there are between the umbilical margin and the suture.

The maximum diameter of the largest and most perfect specimen known (that from Sigutlat Lake), is rather more than four inches and and a-half, and the number of primary ribs on its outer whorl is thirty-two. The septation of the species is still unknown.

O. Loganianus belongs to the same section of the genus as the *O. Astierianus* (which is the *Ammonites Astierianus* of d'Orbigny and Pictet), but its volutions are much more loosely involute, and its umbilicus is far more wide and open. The primary ribs of the outer whorl of *O. Loganianus*, also trifurcate on the middle of the sides, and not comparatively near the suture, as they do in *O. Astierianus*.

(Section B.—*Evolutæ*.)

ANCYLOCERAS RÉMONDI, Gabb.

Plate 28, figs. 2 and 2*a*.

Crioceras (*Ancyloceras ?*) *Rémondi*, Gabb.	—1864. Palæontology of California, Vol. I., p. 75, pl. 14, figs. 24 and 24*a*.
Ancyloceras Rémondi, Gabb.	—1869. Idem., Vol. II., p. 138 and 213, pl. 24, fig. 19.

North shore of Cumshewa Inlet, two specimens, the largest of which is figured.

This species is thus described by Mr. Gabb, in the first volume of the Palæontology of California: "Discoidal; whorls increasing rapidly in size, flattened on the sides; dorsal surface narrow, convex; ventral, flat or very slightly concave. Transverse diameter less than half the dorso-ventral. Space between contiguous whorls narrow, but well marked. Surface marked by numerous small flexuous ribs, of about equal size, which arise on the ventral margin of the whorls and pass entirely across the back: these ribs are often dichotomous, and occasionally, though rarely, anastomose near the dorsum. In one case remains of a few dorsal spines were observed. These were placed in two rows, one on each side of the back. The ventral surface is finely striate transversely, the striæ arching forwards. Of the septum, I have only been able to see the dorsal and superior lateral lobes, and their corresponding saddles."

The specimens of *A. Rémondi* from Cumshewa Inlet appear to differ only from the Californian type of the species in being much larger, and in the circumstance that their ribs are more distant and very rarely dichotomous.

Hamites (?) glaber. (N. Sp.)

Plate 24, figs. 2, 2*a*, 2*b*, and 2*c*.

Shell, so far as known, consisting of two straight and parallel limbs of nearly equal size, one of which is bent so closely on the other that the inner surfaces of both are nearly or quite in contact. Sides of both limbs compressed, so that the outline of a transverse section of either would be elliptic ovate, the siphonal edge being slightly narrower than the antisiphonal. Surface apparently smooth, but marked at widely distant intervals by an occasional arrest of growth in the shape of a broad, but faint and shallow, flexuous and transverse constriction, which is obliquely ascending on the antisiphonal half of the limb and nearly straight on the siphonal half.

Each septum in its entire circumference consists of six bipartite saddles and five bipartite lobes. The siphonal saddle is small and simple, though its summit is minutely three-lobed and its sides thrice incised. The three lateral saddles are nearly equal in size, but the second is a little higher than the first, and the third than the second. They are not at all alike in their ramifications, the second or central saddle being twice bipartite and symmetrically or equally divided, while the first and third saddles are unequally divided throughout, the largest half in each case being that which is nearest to the second saddle. At the base of each of the bipartite saddles there is a short incised spur or offset from each side of the stem. Between the first and second and between the second and third lateral saddles there is a small and simple but laterally incised supplementary saddle, but there is none between the siphonal saddle and the first lateral.

The siphonal lobe is equally and twice bipartite. The first and second lateral lobes, which are nearly equal in size and which are slightly larger than the siphonal lobe and much larger than the antisiphonal, are unequally divided throughout. The first lateral lobe is deeply but unequally twice bipartite above, and its stem bears a pair of simple incised branchlets in the middle. The second lateral lobe is deeply divided into two branches of very unequal size, one of which is simply cleft at the summit, while the other is again deeply divided into two branchlets whose apices are also cleft. The antisiphonal lobe is strictly symmetrical, its extremity being regularly trifurcate and the centre of the stem deeply constricted. Alternating with each of the primary and bipartite lobes there is a single but much smaller supplementary lobule, which although incised is not branched.

North Shore of Cumshewa Inlet: three well preserved but fragmentary casts, all of which are figured.

In the Palæontology of California* Mr. Gabb describes a shell which he refers with much doubt, first to the genus *Ptychoceras* or *Hamites*, and finally to *Ancyloceras* under the name *A. quadratus*, which resembles the present shell in its septation, as well as in the fact that its surface is said to be marked with distant periodical constrictions. The outline of a transverse section of *A. quadratus*, however, is described as sub-quadrate and its sculpture is represented as consisting of "very small rounded ribs." The specimens described above are so imperfect that it is impossible to say whether they should be placed in the genus *Hamites*, *Ptychoceras*, *Hamulina*, *Ancyloceras*, or *Anisoceras*, but their sculpture, apart from the periodic constrictions, appears to have been smooth, and they are certainly elliptic ovate in transverse section.

GASTEROPODA.

Nerinæa Maudensis. (N. Sp.)

Plate 27, figs. 2, 2*a*, 2*b*, 2*c*, and 2*d*.

Shell turreted, very long and slender: whorls exceedingly numerous, the early ones obliquely flattened or slightly depressed, the later ones concave in the middle and highest at the suture: suture very indistinct, placed in the centre of a prominent and continuous spiral ridge, which is rounded at the summit. Outline of aperture unknown. Surface of the later whorls encircled by from six to seven fine and thread-like spiral raised lines. Longitudinal sections show that a triangular and acutely pointed spiral ridge or fold revolves around the inner surface of the outer wall of all the volutions.

East end of Maud Island, opposite Leading Island, in Skidegate Inlet: not uncommon in brittle and very friable shale.

As the shale breaks readily in all directions when dry and as the species is long, slender and fragile, the large specimens, which are often much distorted, are invariably broken. The length of the largest fragment collected (fig. 2), which consists of six of the lower volutions, is forty-five millimetres, and its breadth is nine mm. at the smallest end and seventeen mm. at the largest. A very young individual (fig. 2*b*), whose apex is unusually perfect and which measures sixteen mm. (or five-eights of an inch) in length, and a little less than five mm. in breadth at the larger end, has as many as fourteen

* Volume 1, pp. 74 and 75, pl. 14, fig. 21*a*, pl. 15, fig. 21: also volume 2, p. 213.

volutions. Another immature specimen (fig. 2*c*), whose apex is not quite perfect, and which measures twenty-nine mm. (or an inch and a quarter) in length and eight mm. at the larger end, has eleven volutions preserved. The entire number of volutions was probably about twenty.

This species belongs to the sub-genus *Nerinella* of Sharpe.

Cerithium Skidegatense. (N. Sp.)

Plate 27, figs. 3 and 3*a*.

Shell small, not much exceeding half an inch in length, pupiform, turreted but not much elongated, the length being about twice the greatest breadth: whorls six or seven, the earlier ones obliquely compressed, the later ones more cylindrical: spire not much longer than the last whorl preserved, and possibly not any longer than the body whorl, which is more or less broken in all the specimens collected: suture angularly but not very deeply impressed. Surface marked by rows of beaded or tuberculated spiral raised lines. On the two last volutions but one there are four rows of nearly equidistant, prominent and regularly rounded tubercles. On the upper or posterior half of the last volution preserved there are also four rows of bead-like tubercles, and on the lower or anterior half of the same volution there are three or four spiral raised lines, the uppermost of which is indistinctly tuberculated.

Length of the most perfect specimen (in which part of the body whorl is broken off,) eight millimetres; breadth rather more than three and a-half mm.; length of the last whorl (which is imperfect) nearly four mm.

East end of Maud Island, opposite Leading Island: five or six well preserved but imperfect specimens.

Vanikoro pulchella. (Nom. prov.)

Plate 27, figs. 4 and 4*a*.

Possibly a variety of *Lyosoma Powelli*, White.

Comp. Neritina ? ? Powelli, White. —1876. Powell's Report on a Geological Survey of the Uinta Mountains, p. 110.

" *Lyosoma Powelli*, White. —1880. U. S. Geol. Survey, Contributions to Paleontology, Nos. 2–8, p. 153, pl. 30, figs. 6, 6*a*, 6*b*, 6*c*, and 6*d*.

Shell obliquely subovate, its length and breadth being nearly equal:

volutions about three, increasing very rapidly in size, the last one being extremely large in proportion to the rest; spire small, short, obtuse and not raised much above the highest level of the last whorl; last whorl ventricose and much inflated, especially near and at the mouth, imperforate at the base and marked by a shallowly concave spiral groove or constriction above the middle. Aperture large and wide, nearly circular, but angular at the junction of the outer lip with the inner margin of the mouth; peristome thin and nearly continuous, interrupted only by the encroachment of a small part of the preceding volution; inner lip simple, columellar margin devoid of callus, plication, or emargination.

Surface marked with fine and crowded transverse raised lines, and with prominent and nearly equidistant, transverse rib-like folds. On the last whorl the rib-like plications and raised lines which alternate with them in bundles of from three to five or more, extend from the suture to the base and are not confined to the central and posterior portion of the volution.

Length, nine millimetres: maximum breadth, about nine and a-half.

East end of Maud Island, opposite Leading Island: one small but very perfect specimen.

This shell is possibly a mere variety of *Lyosoma Powelli*, which differs from the type of that species only in its much smaller size, less regular contour and in the fact that its transverse striæ and plications cover the whole of the body whorl and are not obsolete on its basal portion. Its greatest diameter is ten mm., while that of *L. Powelli* is said to be twenty-eight mm. On the other hand the Maud Island specimen almost certainly belongs to the genus *Vanikoro* of Quoy and Gaimard, of which *Narica*, Recluz, is a synonym.

Amauropsis tenuistriata, Whiteaves.

Plate 28, fig. 3.

Amauropsis tenuistriata, Whiteaves. —1876. This volume, p. 48. pl. 9, figs. 4 and 4*a*.

Shingle Bay, on Moresby Island, one specimen: Bay east of Alliford Bay, nine specimens: South Island, five specimens. All these localities are in Skidegate Inlet. As the original figure of this species is not very satisfactory an additional one has been given.

Calliostoma constrictum. (N. Sp.)

Plate 28, figs. 4 and 4*a*.

Shell conical, trochiform, length and breadth about equal: whorls four or four and a half, those of the spire obliquely compressed: suture distinct, flattened at nearly a right angle to the sides of the whorls or somewhat excavated: last whorl about two-thirds of the entire length, (in a dorsal view) concavely and shallowly constricted or grooved above the midde, most prominent a little below the centre: axis imperforate. Aperture rhombic-ovate, outer lip thin and simple; columella truncated and ending in a prominent tooth-like process anteriorly: inner lip expanded at its base and marked by a shallowly arcuate excavation in front of the tooth-like process on the columella.

Surface marked by numerous and rather fine revolving ribs, which when examined by a lens are seen to be crossed by minute and densely crowded oblique striæ.

Length or height, seventeen millimetres and a-half: maximum breadth, seventeen mm.: height of body whorl, eleven mm.

East end of Maud Island, opposite Leading Island: one fine adult specimen with the whole of the characters of the mouth well shown.

Cinulia pusilla. (N. Sp.)

Plate 28, figs. 5 and 5*a*.

Shell very small, subglobose or broadly subovate in outline, its length and breadth being very nearly equal: spire obtuse, short, about one-fourth of the entire length: volutions three, the first and second obliquely convex, the last large, ventricose and inflated: outer lip thickened and margined exteriorly by a rather broad flat band which is narrowest posteriorly: aperture narrow, ovately subpyriform, rounded in front and pointed behind: columellar lip covered with a callus: columellar folds not clearly distinguishable.

Surface markings consisting of numerous spiral rows of minute shallow punctations, with broader and smooth flat spiral bands between them. On the last volution and near the mouth, there are fifteen or sixteen rows of spiral punctures, which latter are about one half as broad as the smooth flat bands between them. Under an achromatic microscope with an inch and a half objective, these spiral punctations are seen to be transversely oval or somewhat rectangular in outline.

Dimensions of a supposed adult specimen: length, nearly five millimetres: maximum breadth, four mm.: height of last whorl as viewed dorsally, three millimetres and three-quarters.

South Island, in Skidegate Inlet: seven specimens, three of which have the thickened outer lip preserved.

Trochactæon cylindraceus, Stoliczka.

Plate 28, fig. 6.

Trochactæon cylindraceus, Stoliczka.	—1868. Palæontologia Indica. Cretaceous Fauna of Southern India, Vol. II., p. 419, pl. 14, figs. 4, 10-14, as *Actæonella cylindracea*.
Perhaps=*Actæonella oviformis*, Gabb.	—1869. Palæontology of California. Vol. II., p. 173, pl. 28, fig. 58.
Actæonina. (Sp. undt.)	—1876. This volume, page 53.

"Trochact. testa ovato-elongato, cylindracea, antice et postice paulo attenuata, spira plus minusve prominente, obtusiuscula; anfractibus angustis, postice oblique et anguste applanatis, deinde subcarinatis; striis incrementi in superficie ultimi anfractus lente curvatis, apertura longa, postice angustissima, antice latiore ac rotundata; labro ad marginem acutiusculo, levigato, antice oblique late ac lentissime effuso; labio levissimo, postice paulo incrassato, antice triplicato: plica antica tenuissima, postice crassissima." Stoliczka.

East end of Maud Island, opposite Leading Island; one small specimen. A number of crushed, distorted and badly preserved examples of a shell which agree in most particulars with the above quoted description of *T. cylindraceus*, though their columellar folds are very indistinctly shewn, were collected by Mr. James Richardson in 1872, at Skidegate Channel, west of Alliford Bay, probably from exactly the same locality as Dr. Dawson's specimen, which is certainly conspecific with them. As indicated in the synonymy, it is most likely that the *Actæonella oviformis* of Gabb is identical with *T. cylindraceus*.

LAMELLIBRANCHIATA.

Teredo Suciensis, Whiteaves.

Plate 29, fig. 1.

Teredo Suciensis, Whiteaves.	—1879. This volume, p. 135, pl. 17, figs. 1 and 1 *a*.

Burrows of a species of *Teredo* which cannot at present be distinguished from *T. Suciensis*, are abundant in pieces of fossil wood col-

lected by Dr. Dawson from rocks of this division on the North Shore of Cumshewa Inlet. Only one specimen of the shell has been seen, which consists of a cast of both valves with most of the test well preserved on the posterior half of each. As the sculpture of the anterior auricle and that of the median area of the valves is not known, the identification of this specimen with *T. Suciensis* is somewhat uncertain.

Martesia carinifera, Whiteaves.

Plate 29, figs. 2 and 2*a*.

Martesia carinifera, Whiteaves. —1876. This volume, p. 54, pl. 9, fig. 7.

Shores of Bear Skin Bay, in Skidegate Inlet: a fine specimen of a colony of the burrows of this species in fossil wood, with several of the shells in situ.

Corbula concinna. (N. Sp.)

Plate 29, figs. 3 and 3*a*.

Shell very small, nearly equivalve, the right valve being a little larger than the left, inequilateral, moderately convex, the thickness through the closed valves being a little less than the greatest height: outline transversly subovate, the length as compared with the breadth being about as seven to five. Anterior end short and regularly rounded at the margin in both valves: posterior end about one-third longer than the anterior, narrowing equally towards its termination, which is obliquely truncated and biangular in the left valve and whose upper angle is rounded off in the right. Cardinal margin rounding abruptly downwards in front, straighter and sloping very gently downwards behind: ventral margin convex and evenly rounded anteriorly, straighter and ascending very gradually posteriorly, most prominent a little in advance of the mid-length. Beaks broad and not very prominent, incurved, inclined slightly forwards and situated about halfway between the centre of each valve and the farthest extremity of the anterior end. On the left valve a distinct umbonal ridge extends from the beaks to the posterior end of the base, and behind and above this ridge the valve is inflected at an obtuse angle. On the right valve the corresponding umbonal ridge is almost obsolete and the posterior area ill-defined.

Surface marked with fine, crowded, and rather irregularly disposed concentric ribs.

Length, seven millimetres; greatest height, five mm.; thickness through the closed valves, four mm.

South side of Alliford Bay, Skidegate Inlet, very abundant and in good condition; Bear Skin Bay, one specimen.

Of the six species of *Corbula* described by Mr. Gabb from the Californian Cretaceous, this little shell comes nearest to *C. parilis*,* but it is much more diminutive in size, more inequilateral, and shows no traces of radiating striæ between the concentric ribs.

PERIPLOMA CUSPIDATUM. (N. Sp.)

Plate 29, figs. 4, 4*a* and 4*b*.

Shell compressed but perhaps abnormally flattened; apparently thin and lenticular, nearly equivalve, but very inequilateral: anterior end subcircular in some specimens, more narrowly rounded in others, usually gibbous and somewhat produced at or near the termination of the base in front; posterior end shorter than the anterior, abruptly cuspidate, either rounding more or less regularly upwards and outwards from below, and forming an angular or subangular junction with the hinge line above, or contracting suddenly and concavely above into a short, narrow and upturned beak, of which the hinge line forms the upper boundary. Ventral margin broadly rounded, but sometimes gibbous or subangular in front: superior border convexly arched in front and concave behind. Beaks broad, low, depressed, recurved and placed considerably behind the middle. Posteriorly the beaks are bounded by a single, short, oblique and narrowly linear groove, which indicates the probable existence of a corresponding thin and laminar rib on the inner surface of the posterior umbonal slope in each valve.

Surface apparently smooth or marked only by a few faint concentric striations.

Length in the middle of the valves, twenty millimetres: maximum height twenty-four mm. and a-half.

North side of Maud Island: two specimens with both valves flattened out and a single right valve.

This shell is evidently congeneric with the *Periploma suborbiculatum* described on page 138 of the present volume from a single specimen collected by Mr. James Richardson in 1872 from the Upper Cretaceous rocks of the Nanaimo River, V. I. It may be only a variety of that species, but appears to differ therefrom in its narrowly and shortly beaked posterior extremity, less central beaks and in having only one laminar ridge on the interior of each valve.

The lateral outline of the valves of some specimens of this species is singularly like that of the *Meekia sella* of Gabb,† but the present

* Palæontology of California. Vol. I., p. 150. pl. 29, figs. 239 and 239*a*.
† Palæontology of California. Vol. 1, p. 191, pl. 25, fig. 179.

shell clearly belongs to the *Anatinidæ*, while *Meekia* is supposed to be allied to *Trigonia* or *Tancredia*.

Thracia semiplanata. (N. Sp.)

Plate 29, figs. 5, 5*a*, 5*b* and 5*c*.

Thracia, Sp. Undt.—This volume, page 57.

Shell transversely elongated, compressed, inequivalve, the right valve being moderately convex and the left almost flat; nearly equilateral: anterior end subangular or obtusely pointed below the middle in some specimens, but rounded in others: posterior end about equal in length to the anterior but squared and truncated or subtruncated almost at a right angle to the ventral margin. Superior border very oblique anteriorly, sloping convexly and rapidly downwards and meeting the upward curve of the basal margin at an obtuse angle; behind the beaks the superior border descends also obliquely, but not quite so rapidly, and in some specimens very gently and in a straight line or shallowly concave curve, to its junction with the posterior margin: basal margin nearly straight in the centre. Umbones broad, prominent, and nearly central, beaks slightly depressed, curved strongly inwards and backwards. In well preserved specimens the posterior area is bounded by a sharp, but not very prominent ridge or keel, which extends from the beaks to the posterior end of the base, and behind and above which the valves are obliquely inflected. On the hinge line also, behind the beaks, there is a long and narrow, linear-lanceolate and shallowly excavated ligamental area.

Sculpture somewhat variable; in some specimens the surface is very finely striated, in others the concentric striations are coarser and consist of closely disposed raised lines which are most densely crowded on the posterior area.

Length of a large specimen, fifty-six millimetres; height, thirty-eight mm.; thickness through the closed valves, twenty mm.

Abundant and in a fine state of preservation on the South side of Alliford Bay; Bear Skin Bay, Skidegate Inlet, two specimens; South Island, one specimen.

The above description is intended to express the characters presented by normal and undistorted specimens. In this condition even the species is very variable in form as well as in sculpture. Thus, in some specimens the shell is more or less pointed, though obtusely so, below the middle or near the base anteriorly, in others the anterior margin is rounded. The upper or cardinal margin of the posterior end is

nearly as oblique as that of the anterior end in some specimens, and almost horizontal in others, and again the truncated margin of the posterior end may be either straight or slightly convex.

When distorted, as the specimens frequently are, and in almost every conceivable way, the range of variation in form is, of course, still greater. Some individuals are so much elongated transversely and so narrow in the direction of their height that Pictet's figures of the *Thracia Sanctæ-Crucis*, from the Upper Gault of Switzerland would represent them very accurately, though the normal form, as stated on page 56 of the present volume, is much more like that of the *Thracia* (or *Corimya*) *Nicoleti*, of Agassiz, from the Swiss Lower Neocomian.

This species and *Caryatis subtrigona* are by far the most abundant of the lamellibranchiate bivalves collected by Dr. G. M. Dawson.

Pleuromya subcompressa, Meek.

(Typical form.)

Plate 29, fig. 6.

Myacites (*Pleuromya*) *subcompressa*, Meek.—1873. Annual Report of the United States Geological Survey of the Territories for 1872, p. 472.
" " " " —1877. United States Geological Survey of the 40th parallel, Vol. IV., p. 136., pl. 12. figs 6 and 6a.
? = *Pleuromya papyracea*, Gabb. —1869. Palæontology of California, Vol. II. p. 178, pl. 29, ffg. 66.

Beaks prominent and erect: surface marked by concentric plications " that become nearly obsolete on the posterior dorsal region and near the front."

South side of Alliford Bay: a perfect and well preserved cast of the interior of the right valve.

The specimen agrees well with Mr. Meek's description and figure of the type of *Myacites subcompressus* and with Mr. Gabb's diagnosis and figure of *Pleuromya papyracea*, or more properly still of *Panopea papyracea*, as the broad and deep sinus in Mr. Gabb's type shows that it is congeneric with the Cretaceous Panopæas.

Pleuromya subcompressa, var. Carlottensis.

Plate 29, figs. 7 and 7*a*.

Pleuromya Carlottensis, Whiteaves. —1876, This volume, p. 57, pl. 9, fig. 8.
Myacites subcompressus. White, (As of Meek.)—1880, United States Geological Survey. Contributions to Palæontology, Nos. 2–8, pl. 38, fig. 5c; cæt. excl.
Comp. *Pleuromya Newtoni*, Whitfield. —1877. Preliminary Report on the Black Hills, p. 20.
" " " —1880, United States Geographical and Geological Survey of the Rocky Mountain Region, Geology of the Black Hills of Dakota, p. 367, pl. 5, figs. 19 and 20.

Umbones broad and depressed: beaks (or apices of the umbones) curved inwards, downwards and inclined a little forwards: shape, with this exception, and sculpture as in the type of *P. subcompressa*.

South side of Alliford Bay, five casts of the interior: East end of Maud Island, one specimen. On the mainland of British Columbia it occurs also in the porphyrites and felsites of Sigutlat Lake and the Iltasyouco River, where it was collected by Dr. G. M. Dawson in 1876.

The specimen from which the description of *P. Carlottensis* was made is a distorted and imperfect cast, and the figure of it on Plate 9 of the present volume is by no means satisfactory. Although most of the Canadian specimens collected since are also either distorted or imperfect, they show that the shell is very variable in shape, and that it is usually more elongated transversely than the original figure of it might lead one to suppose. The anterior end, which is very short, is excavated under the beaks and abruptly truncated below in the best preserved examples: the posterior end is elongated and either narrowly rounded or somewhat pointed at its junction with the ventral margin.

Some individuals of *P. Carlottensis* appear to be intermediate in their character between *P. Newtoni*, Whitfield, and *P. subcompressa*, Meek, their shape being like that of the former species, and their sculpture like that of the latter. Judging by the figure on Plate 38 of Dr. C. A. White's "Contributions to Palæontology," other specimens appear to be conspecific with the fossil from Devils' Slide, Cinnabar Mountain, Montana, which Dr. White says "may prove to be a different species," but which he regards provisionally as "only a variety of *Myacites subcompressus*." In the writers' judgment, *P. Carlottensis* also is doubtfully distinct from *P. papyracea*, Gabb.

Pleuromya (subcompressa ? var.) lævigata.

Plate 30, figs. 1, 1*a*, 1*b*, and 1*c*.

Myacites subcompressus, White. —1880. United States Geological Survey, Contributions to Palæontology, Nos. 2–8, p. 151, pl. 38, figs. 5*b* and 5*c*: cœt. excl.

Shell compressed, most convex near the anterior margin and somewhat wedge-shaped as seen from above. Valves closed in front, slightly gaping behind, transveresly elongated, the length being twice the height in some specimens and less than twice in others, very inequilateral: anterior end short and truncated or sub-truncated at almost a right angle to the ventral margin: posterior end much longer and either rounded or sub-truncated somewhat obliquely at its extremity. Cardinal margin short, excavated and sloping suddenly downwards in front: straighter and descending much more gradually behind: ventral margin nearly straight. Umbones large, broad and prominent: beaks small, curved inwards, downwards and a little forwards, and either anterior and nearly but not quite terminal or placed about half way between the centre of the superior border and its anterior termination. Anterior umbonal ridge obtusely angular and extending from the beaks to the anterior end of the basal margin: in front of this ridge or prominence the valves are bent obliquely and abruptly inwards, and immediately behind it there is a broad and faint shallow depression: posterior umbonal ridge well defined above, but becoming gradually obsolete below.

Surface marked with fine and rather crowded concentric striations. Hinge teeth and muscular impressions unknown.

In two specimens the maximum height is twenty millimetres and the thickness twelve, but the length of the one is forty mm., while that of the other is only thirty-three.

South side of Alliford Bay, nine casts of both valves: East end of Maud Island, three similar casts. This form occurs also in the felsites of the Iltasyouco River, B.C., where it was collected by Dr. G. M. Dawson in 1876. The specimens from this latter locality were doubtfully and as it would now seem erroneously identified with the *Pleuromya subelliptica* of Meek and Hayden in the Report of Progress of the Geological Survey of Canada for 1876-77.

The shells described above appear to be precisely similar to two Montana specimens which are figured by Dr. C. A. White as varieties of *Myacites subcompressus*, Meek, although on the otherhand it is difficult to see how they can be distinguished from some of the Gault

varieties of the *Panopea Neocomiensis* of d'Orbigny, as represented in the "Paléontologie Française" or the "Paléontologie Suisse."

GONIOMYA. (Species undeterminable.)

South side of Alliford Bay, a very small but well preserved cast, which measures nine millimetres in length by about six or seven in height. A similar specimen has been collected in the Upper Neocomian rocks of the valley of the Fraser River.

TELLINA SKIDEGATENSIS. (N. Sp.).

Plate 30, figs. 2, 2*a*, and 2*b*.

Shell thin, compressed, transversely elongated, the length being about one-third greater than the height: lateral outline varying in different specimens from ovately and broadly subtriangular to transversely subelliptical. Anterior end somewhat pointed or narrowly rounded: posterior end always a little longer than the anterior, subtruncated and narrowing gradually both above and below, or rounded below and obtusely subangular above. Superior border sloping concavely and rather rapidly downwards in front of the beaks, straighter and descending more gradually behind: ventral margin broadly rounded. Beaks moderately prominent, curved inwards and forwards and placed a little in advance of the middle.

Surface closely and concentrically costulate.

Pallial sinus very obscurely indicated, but apparently broad and rather deep.

Length of a left valve with the test preserved, twenty-six millimetres: maximum height of the same, seventeen mm. In a larger cast the length is forty-one millimetres and the greatest height twenty-six.

Bear Skin Bay, Skidegate Inlet: four or five specimens.

This shell probably does not belong to the typical section of the genus *Tellina*, as exemplified by the recent *T. radiata* of Linnæus and two or three others, but to the subgenus *Tellinella* or *Peronœoderma*. It approaches the *Tellinella petrosa* of Stoliczka,* from the Cretaceous rocks of S. India, in many of its characters, especially in its surface ornamentation, but it is much less pointed at each extremity.

Two casts of single valves of a small *Tellina* which may possibly be

* Pal. Indica. Cret. Faun. S. India. Vol. 3, p. 125, pl. 16, figs. 27-28.

identical with the present species, the most perfect of which is represented by figure 3 of plate 30, were collected on the north side of Maud Island. The specimens from this locality, which do not shew any trace of the two surface markings, are smaller, less elongated transversely in proportion to their height, and more nearly equilateral than the types of *T. Skidegatensis.*

Caryatis subtrigona, Whiteaves.

Callista (*?*) *subtrigona*, Whiteaves.	—1876.	This volume, p. 63, pl. 9, fig. 10.
Lucina. Sp. Undt. "	— " " "	p. 61, fig. 6, and pl. 9, fig. 12.
" (*?*) " "	— " " "	p. 62, fig. 7.

Bear Skin Bay, Skidegate Inlet, extremely abundant: South side of Alliford Bay, apparently not quite so common.

The large series of specimens collected by Dr. Dawson prove conclusively that the fossils doubtfully described on pages 61 and 62 of the present volume as species of *Lucina* are really only distorted and imperfect examples of *Caryatis subtrigona.*

Thetis affinis. (Nom. prov.)

Plate 30, figs. 4, 4*a* and 4*b*.

Probably a variety of *Thetis major*, Sowerby.	
Compare *Thetis major*, Sowerby.	—1829. Mineral Conchology, Vol. VI., p. 20, pl. 513, figs. 1 to 4.

Shell rather large (for the genus), moderately convex, the thickness through the closed valves being about one-third less than the maximum height; outline variable; in some specimens the lateral contour is transversely ovate-orbicular, the ventral margin being more broadly rounded than the anterior end, and the posterior end narrower and a little longer than the anterior; in others, which are very inequilateral, the valves are ovately subtrigonal as viewed laterally, the short anterior end being subangular at its junction with the superior border above, and the produced posterior end obtusely pointed below the middle. Umbones large and prominent: beaks curved inwards, downwards, and a little forwards, subcentral in some specimens and placed very near the anterior end in others.

Surface marked with rather irregularly disposed concentric lines of growth, and by a few very faint radiating striæ.

Hinge teeth unknown. Muscular impressions transversely elongated

and ovate-lanceolate in outline: pallial border strongly twice inflected: pallial sinus proper very deep, narrow, acutely pointed, extending far into the umbonal cavity, and reaching as far backwards as to within one or two mm. from the tips of the beaks; anterior pallial inflection also very deep, but broader and not extending quite so far backwards as the inner termination of the true pallial sinus.

Dimensions of a specimen which is ovately-orbicular in outline: length, forty-two millimetres, height, thirty-seven and a-half mm.: maximum thickness twenty-three. In an ovately subtrigonal cast of this species the maximum length and height are each fifty mm., and the thickness through the closed valves is thirty-five.

Bear Skin Bay, Skidegate Inlet: eleven specimens.

The very deep double inflection of the pallial border appears to be the only point wherein this shell differs from the *Thetis major* of Sowerby. In other respects the present species seem to be intermediate between the *T. minor* and the *T. major*. Some paleontologists, such as F. Rœmer, E. Forbes, and Mons. Ebray, regard all the nominal species of *Thetis* as varieties of one, which Rœmer proposes to call *T. Sowerbii*, and if this view be adopted, the *Thetis* above described will of course rank only as one of the forms of *T. Sowerbii*.

CYPRINA OCCIDENTALIS. (N. Sp.)

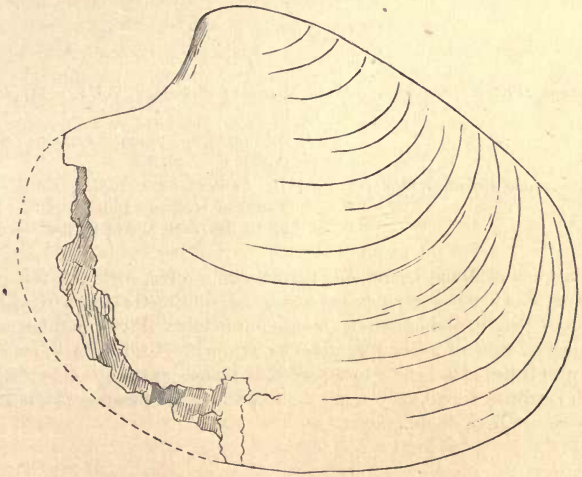

Fig. 10. *Cyprina occidentalis.* Outline of a cast of a left valve.

Shell (or rather cast) compressed, the maximum thickness being a little more than half the height; outline transversely subovate: anterior end short and rather narrowly rounded; posterior end longer and subtruncated below the middle; superior border descending abruptly and concavely in front of the beaks, sloping gradually and somewhat convexly downwards behind; umbones broad and rather prominent, beaks slightly depressed, appressed and directed forwards. Surface marking, hinge teeth and muscular impressions unknown.

Dimensions: length, ninety-four millimetres; height seventy-five mm.; maximum thickness, forty-three.

South side of Alliford Bay: a single imperfect cast.

The specimen is supposed to belong to the genus *Cyprina* on account of its strong resemblance to the *C. ovata* of Meek and Hayden, of which latter species large numbers of fine examples, with the test preserved, have recently been collected by Dr. G. M. Dawson, R. G. McConnell and T. C. Weston at the St. Mary's, Belly and South Saskatchewan rivers. The *C. occidentalis* may be only a variety of *C. ovata*, but it appears to be more transversely elongated, more truncated posteriorly and more gibbous in the umbonal region. The two shells also occur at very different horizons in the Cretaceous formation.

Protocardium Hillanum, Sowerby. (Sp.)

Plate 30, fig. 5.

Cardium Hillanum, Sowerby. —1813. Mineral Conchology, Vol. 1, p. 41, pl. 14, fig. 1.

" " " —1843. Paléontologie Française Terrains Crétacés, Vol. 3, p. 27, pl. 243.

Protocardium Hillanum, Stoliczka. —1871. Palæontologia Indica, Cretaceous Fauna of Southern India, Vol. 3, p. 219, pl. 12. figs. 8–10, and pl. 13, figs. 1–3.

East end of Maud Island, one perfect right valve, with the test preserved, which, however, measures only nine millimetres and a half in its greatest length, and nine in its maximum height. Five small but well preserved casts of a small *Protocardium* from the S. side of Alliford Bay are also believed to belong to this species, though as the specimens from both localities are all very small their specific identification is not altogether free from doubt.

Astarte Packardi, White.

Plate 30, figs. 6, 6*a* and 6*b*.

Astarte Packardi, White. —1880. United States Geological Survey, Contributions to Paleontology, Nos. 2-8, p. 149, pl. 37, figs. 6*a* and *b*.

"Shell subcircular in marginal outline, moderately and almost regularly convex: its length and full height almost equal, or the latter a trifle less than the former; margin forming a continuous subelliptic curve all the way around from the posterior end of the hinge to the lower end of the lunule; hinge margin short and gently convex; beaks placed subcentrally, rather small but prominent, and turned forward; lunule moderately large, rather deeply impressed and clearly defined, its abruptly inflected borders giving a concave appearance to that portion of the shell as seen by lateral view. Surface marked by somewhat numerous and regular concentric undulations, and between these, by minute striæ of growth. Hinge unknown.

Transverse length, twenty millimetres; height from base to beaks nearly one millimetre less." White.

East side of Alliford Bay: four large and beautifully preserved specimens with the test, and a few fragments: South side of Alliford Bay, abundant in the condition of small but perfect casts: East end of Maud Island, five small examples with the test preserved.

The specimens from the above mentioned localities, which the writer has no doubt are correctly identified with *A. Packardi*, give the following additional information about its specific characters. At Maud Island the shell attains to the size of thirty millimetres in length by as many in height. The hinge dentition consists of two transverse cardinal teeth in each valve, and there are no laterals. In the right valve both teeth are most prominent in the middle, but the anterior cardinal tooth is triangular in outline and comparatively large. The inner margin of the valves below and at the side is simple in some specimens and distinctly crenulated in others, as in the recent *A. sulcata* of da Costa.

Dr. White says "This shell is probably not a true *Aslarte* as that genus is recognized among living forms, but it probably belongs to a section to to which Gabb gave the name *Eriphyla*.* The type of Sowerby's genus, however, is his *A. lurida* of the Inferior Oolite, whose characters are very near to those of *A. Packardi*.

The three or four imperfect and badly preserved casts from the felsites of the Iltasyouco River, B.C., which were provisionally identified

* Op. cit., p. 149.

with the *A. ventricosa* of Meek on page 155 of the Report of Progress of the Geological Survey of Canada for 1876-77, most probably also belong to the present species.

Unio Hubbardi, Gabb.

Unio Hubbardi, Gabb. —1869. Paleontology of California, Vol. 2, p. 190, pl. 30, fig. 85.
" " Whiteaves.—1876. This volume, p. 65, pl. 9, fig. 13.

Hooper's Creek or King's Tunnel, Cowgitz' coal mine: very abundant. It was collected at the same locality by Mr. Richardson in 1872.

As pointed out on pages 66-67 of the present volume, the hinge dentition shows that the species is a true *Unio* and not a *Margaritana* nor an *Anodon*.

Trigonia diversicostata, Whiteaves.

Trigonia diversicostata, Whiteaves. —1876. This volume, p. 68, pl. 10, fig. 1.

Bear Skin Bay, Skidegate Inlet: three specimens.

Trigonia Maudensis. (N. Sp.)

Plate 31, fig. 2.

Shell moderately convex, longer than high, very inequilateral: anterior end short and rounded: posterior end produced into a rather long and pointed beak, which narrows gradually both above and below, and whose lower margin is somewhat convex and upper margin shallowly concave. Umbones narrow but very prominent, placed about half way between the centre and the farthest extremity of the anterior end; beaks, small, curved inwards and downwards: posterior area well defined and bounded by a rather prominent carina, which is acutely angular near the beaks and obtusely angular behind the middle of the valves.

The front and central portions of the sides of the valves are marked by simple concentric ribs, but at the pointed extremity of the posterior third of the sides these concentric ribs are crossed by a few radiating costæ, which commence at or a short distance below the outer boundary of the posterior area and extend to the ventral margin. In the most perfect specimen, which was collected at Maud Island, there are five radiating ribs on the posterior extremity, two of which, the ones nearest to the anterior end, are comparatively broad, while the three behind them are very narrow and inconspicuous. In two moulds of the exterior of a small *Trigonia* from Cumshewa Inlet, however, which probably

belongs to this species, there are indications of four or five very coarse radiating ribs on the posterior extremity of the sides, all of which are of equal breadth. Posterior area marked by very oblique raised striæ.

Length, thirty-four millimetres: maximum height, from the centre of the umbo to the ventral margin, twenty-four mm.

North side of Maud Island, a perfect but not very well preserved right valve. South Island, one specimen: north side of Cumshewa Inlet: two imperfect moulds of the exterior and one cast of the interior.

This shell may be an extreme variety of the preceding species, from which it differs chiefly in the peculiar ornamentation of its outer surface. It appears to be nearly related to the *Trigonia sulcataria* of Lamarck,* from the "Craie Chloritée" or "Upper Greensand" of France.

Trigonia Dawsoni, Whiteaves.

Plate 31, figs. 1 and 1*a*.

Trigonia Dawsoni, Whiteaves. —1878. Geological Survey of Canada, Report of Progress for 1876-77, p. 154.

"Shell gently convex, compressed; outline ovately-subtrigonal; anterior end very short, broadly rounded, as is also the ventral margin: beaks elevated, recurved, anterior, subterminal: hinge line sloping concavely downwards behind the beaks: extremity of the somewhat elongated posterior end truncated rather obliquely. Surface of the main body of the shell marked by about twelve curved, nodulous costæ, all of which commence at the margin of the posterior area. The five nearest the beaks curve downwards and terminate at the anterior end. The middle ones, though curved, are nearly transverse, and end at the centre of the ventral margin, while the last three incline decidedly backwards. The posterior area is marked either by crowded, transverse, regularly arranged and continuous raised striæ, or by coarse, irregular and broken up or angularly bent, short, tranverse folds. Iltasyouco River and Sigutlat Lake, frequent and well preserved." The above is the original description of the species as it occurs in the volcanic porphyrites of the localities mentioned, on the main land of British Columbia.

South side of Alliford Bay: one fine specimen with the test well preserved on both valves, but with a small piece broken off the posterior end.

The specimen from the Queen Charlotte Islands differs from the types of *T. Dawsoni* in the following particulars, though these differences

* See D'Orbigny. Paléontologie Française, Terrains Crétacés. Vol. 3, p. 150, atlas, pl. 294, figs. 5-9.

are obviously not of specific importance. In the Alliford Bay shell the number of curved nodulous ribs on the sides of the valves is at least eighteen: its posterior area, in addition to the transverse lines which cover its surface, is marked by three equidistant, curved, longitudinal rows of nodules or nodulous ridges, in each valve, which extend from the beaks to the posterior margin. The lower row of nodules which bounds the posterior area externally, is prominent and composed of comparatively large nodules, but the two upper nodulous ridges are not so prominent and are composed of much smaller nodules.

It is not improbable that *T. Dawsoni* may be only a variety of the *T. Montanaensis* of Meek,* but for the present it is thought prudent not to unite the two forms under one name, for the following reasons. In *T. Montanaensis* the front margin of the valves is said to be ornamented by a transverse row of nodules which latter are "larger than the others and are ranged in a vertical row of strong nodules, which form a conspicuous feature of the shell,"† and its posterior area is described as "marked only by numerous, distinct, nearly vertical lines of growth."‡ There is no such vertical row of large nodules on or near the anterior margin of any of the specimens of *T. Dawsoni*, and on the posterior area of the Queen Charlotte Island variety of that species the transverse raised lines, as already stated, are crossed by three nodulous ridges or longitudinal rows of isolated nodules.

Nucula (Acila) truncata, Gabb.

Nucula truncata, Gabb. —1864. Palæontology of California, Vol. I, p. 198, pl. 26. figs. 184 and 184 *a*, *b*.

Bear Skin Bay and Bay east of Alliford Bay, in Skidegate Inlet: one characteristic specimen from each of these localities.

Nucula solitaria, Gabb.

Plate 31, figs. 3 and 3*a*.

Nucula solitaria, Gabb. —1869. Palæontology of California, Vol. 2, p. 197, pl. 32, fig. 94.

South side of Alliford Ray: nine good casts of both valves with por-

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* See Dr. C. A. White's Contributions to Palæontology, Nos. 2-8. Washington. 1880. P. 147, pl. 38, fig. 2*a*.

† *Ib.*, page 146.

‡ *Ib.*, page 146.

tions of the shell preserved. The specimens, one of which is represented on Plate 31, agree well with Mr. Gabb's description of *N. solitaria*, and are almost exactly of the same dimensions as his type.

Yoldia arata. (N. Sp.)

Plate 31, figs. 4 and 4*a*.

Yoldia. (*Sp. undt.*) This volume, page 72.

Shell small, tumid, transversely elongated and very inequilateral: anterior end narrowly rounded or somewhat pointed in the middle: posterior end about one-third longer than the anterior, attenuated and produced into a straight and narrow or slightly curved and somewhat broad beak. In some specimens the beaked posterior extremity narrows gradually and almost equally both above and below, and its extreme apex is truncated: in others the margin of the posterior end rounds up obliquely from below and forms a subangular or pointed junction with the shallowly concave or straight downward slope of the hinge border above. Umbones small, narrow, projecting very little above the hinge line and placed in advance of the middle: beaks minute, curved inwards and a little downwards, with a slight inclination towards the posterior end. Posterior area linear-lanceolate in outline, as viewed from above, consisting of an abrupt and obtusely angular inflection of each valve behind the beaks.

Surface marked with minute grooves and raised ridges which are very irregular in their disposition, but which as a whole are very nearly concentric. Sometimes the ridges are not continuous, and they are rarely either quite parallel with each other or with the ventral margin. In some specimens, also, the grooves are comparatively broad and separated by exceedingly narrow raised lines: in others the grooves and subangular ridges which alternate with them are equal in breadth.

Dimensions of an average specimen: length, ten millimetres: height, six mm. and a-half: thickness through the closed valves a little over four mm.

South Island, Skidegate Inlet, abundant: Bear Skin Bay, Skidegate Inlet, three specimens: Cumshewa Inlet ("horizon doubtful," G. M. D.), four specimens.

Nemodon Fischeri, d'Orbigny. (Sp.)

Plate 31, fig. 5.

Arca Fischeri, d'Orbigny.	—1850. Paléont. stratigr. 1, p. 369, Paris.
Arca concinna, d'Orbigny.	—(as of Von Buch.) 1845. Géologie de la Russie d'Europe et des Montagnes de l'Oural, Vol. 2, p. 462, pl. 39, figs. 17-18.
Cucullæa Fischeri, d'Orbigny (Sp.)	—Eichwald. 1867. Lethaea Rossica, Vol. 2, p. 559.
Arca concinnata, Graf. Keyserling.	—Petschorareise, p. 306.

"Arca testâ elongatâ, inflatâ, radiatim striatâ: latere buccali, brevi, angustato; latere anali elongato lato, obliquè sinuato; area ligamenti angustatâ.

Coquille très allongée, assez renflée, marquee partout de stries rayonnantes avec lesquelles se croisent quelques lignes d'accroissement concentriques. Côté buccal très court, anguleux du côté de l'area cardinale côté anal très long, élargi, coupé obliquement et échancré à son extrémité. Facette du ligament très longue, étroite, très finement sillonnée. *Dimensions.* Longeur 37 millimetres. Par rapport à la longueur: largeur, 0·40; épaisseur, 0·35; longueur du côté anal, 0·75." d'Orbigny, Geol. de la Russ., &c., Vol. 2, p. 462.

"La figure donnée par M. d'Orbigny montre le bord inférieur légèrement échancré, et l'extrémité postérieure de la coquille pourvue d'une légère carène médiane oblique, située entre la carène obtuse extérieure oblique et le bord cardinal du test; la description de M. d'Orbigny ne fait pas mention de ce caractére." Eichwald, Lethaea Rossica, Vol. 2, p. 559-60. "*Hab.* dans le grès néocomien noirâtre de Khoroschowo" (near Moscow) "et dans le grès blanc compacte à grains de glauconite près d'Orenbourg au mont Isaragoul." Ib., p. 559. At each of these places it is found associated with *Aucella Mosquensis*, which latter shell occurs also at the Queen Charlotte Islands.

Abundant in fine condition at the east end of Maud Island. The hínge dentition shews that it belongs to Conrad's genus or subgenus *Nemodon*.

GRAMMATODON INORNATUS, Meek and Hayden.

Plate 31, figs. 8, 8*a*, and 8*b*.

Arca (*Cucullæa*) *inornata*, Meek and Hayden. —1858. Proceedings of the Academy of Natural Sciences of Philadelphia, p. 51.

Grammatodon inornatus, Meek and Hayden. —1862. Idem, p. 419.

" " " " " —1864. Palæontology of the Upper Missouri, p. 90, pl. 3, figs. 9, 9*a* and 9*b*.

" " Whitfield. —1880. Geology of the Black Hills of Dakota, p. 359, pl. 5, figs. 16-18.

North shore of Cumshewa Inlet, one nearly perfect specimen with the valves widely open and partly clasping a valve of *Inoceramus concentricus.*

Skidegate Inlet, south side of Alliford Bay, four specimens: and Bay east of Alliford Bay, one imperfect example.

CUCULLÆA (IDONEARCA). Species undeterminable.

Cucullæa (?). Sp. Undt. This volume, page 73.

East end of Maud Island: a crushed and imperfect specimen which, however, has the sculpture well preserved on both valves.

The surface markings consist of very numerous and densely crowded concentric raised lines, which are crossed by radiating striæ. On the posterior and central portions of the sides of the valves the radiating striæ are close together and not much elevated, but near the anterior margin they are distant, prominent and very acute.

TRIGONOARCA TUMIDA. (N. Sp.)

Plate 31, fig. 6.

Shell inflated, tumid, the thickness through the closed valves being apparently a little greater than their maximum height: valves transversely elongated and very inequilateral: anterior end short, rounding up broadly and obliquely from below and forming a sharply angular junction with the superior border above. Superior border nearly straight both in front and behind, but sloping very gently downwards

in front: ventral margin also nearly straight behind the middle, but obliquely as well as rather abruptly rounded upwards in front. Umbones gibbous and very prominent, placed a little in advance of the middle: beaks distant, curved strongly inwards and downwards, with a slight inclination towards the anterior end: ligamental area deeply and angularly excavated, narrowly subrhomboidal in outline as viewed from above: posterior area obliquely flattened, margined by an obtuse and not very well defined keel. Surface marked with crowded and rather irregularly disposed concentric striations, which are crossed, except upon the posterior area, with numerous radiating raised lines. These latter are most prominent and distinct on the anterior third of the shell. The ligamental area, also, is closely and concentrically striated.

Hinge teeth and muscular impressions unknown.

Dimensions of the only specimen collected: length, eighty-seven millimetres; height, fifty-six mm.; approximate thickness through the closed valves, sixty-four mm.

East end of Maud Island: a perfect and well preserved right valve.

The specimen evidently belongs to a new and interesting species of *Trigonoarca*, which can be easily distinguished from the type of Conrad's genus of that name, the *Arca Ligeriensis* of d'Orbigny, (*) by its very prominent umbones and distinct and numerous radiating raised lines.

Mytilus lanceolatus, J. Sowerby.

Plate 31, figs. 7 and 7*a*.

Mytilus lanceolatus, J. Sowerby.	—1823. Mineral Conchology, Vol. 5, p. 55, pl. 439, fig. 2.
Mytilus edentulus, "	—1823. Mineral Conchology, Vol. 5, p. 55, pl. 439, fig. 1.
Mytilus tridens, "	—1836. In Fitton's paper in the Translations of the Geological Society of London, Vol. 4, Second Series, p. 342, pl. 17, fig. 14.
Mytilus prælongus, "	—1836. *Ib.*, p. 342, pl. 17, fig. 15.
Mytilus lanceolatus, d'Orbigny.	—1844. Paléontologie Française, Terrains Crétacés, Vol. 3, p. 270, atlas, pl. 338, fig. 6.
Mytilus lanceolatus, Pictet.	—1864-67. Paléontologie Suisse, Terrain Crétacé de Ste. Croix, Vol. 3, p. 485, in which a full synonymy of the species may be found.

Shell obliquely compressed above, strongly carinated below the middle, especially in front, and excavated at the base, in such a manner

* Paléontologie Française. Terrains Crétacés. Vol. 3, p. 227, pl. 317.

that the outline of a transverse section through the centre of the valves would be subtriangular, the two upper sides being somewhat convex and the base shallowly concave: maximum thickness, as measured from keel to keel, a little greater than the height. Lateral outline narrowly mytiloid, valves slightly curved and much elongated transversely: anterior end acutely pointed: posterior obtuse: superior border broadly arched but not very prominent: basal margin shallowly concave: beaks anterior, terminal and approximated. Surface apparently marked by coarse concentric striæ of growth, with finer striæ intercalated between them.

Length of the only specimen collected, fifty-six millimetres: height, as measured from the lateral keel to the centre of the hinge line, eighteen mm.: greatest thickness, from keel to keel, twenty-two mm.

Shingle Ray, Skidegate Inlet: a cast of both valves with a very small piece of the test preserved.

The above is a purely original description of the specimen collected by Dr. Dawson, from which it may be seen that its characters do not seem to differ in any essential particular from those of the *M. lanceolatus* of Sowerby as described by d'Orbigny, Pictet and other palæontologists.

Modiola subimbricata, Meek.

Modiola (*Volsella*) *subimbricata*, Meek.	—1873. Annual Report of the United States Geological Survey of the Territories for 1872, p. 472.
" (Sp. undt.)	—This volume p. 73.
Volsella subimbricata, White.	—1880. United States Geological Survey. Contributions to Palæontology, Nos. 2–8, p. 145, pl. 37, figs. 2*a b*, &c.

East end of Maud Island: three distorted specimens, two of which, however, have the test preserved on both valves.

Lithodomus Maudensis. (N. Sp.)

Plate 32, figs. 6 and 6*a*.

Shell convex, the maximum thickness through the closed valves being about equal to their greatest height, most prominent laterally, in the direction of a curved line which might be drawn from the under side of the beaks to the posterior end of the base, beneath and in front of

which slight prominence the valves are abruptly and obliquely compressed as well as somewhat excavated. Length nearly twice as great as the height: lateral outline subelliptical: anterior end truncated inwardly and obliquely under the beaks: posterior end narrowly rounded: superior border regularly, convexly and very broadly arched: ventral margin nearly straight or slightly concave in advance of the middle and as slightly convex behind, forming an obtuse angle with the anterior margin and a rounded junction with the posterior: beaks anterior, terminal and overhanging, approximated and curved downwards as well as inwards.

Surface marked by a few faint concentric lines of growth. In specimens which have the exceedingly thin outer layer of the test exfoliated, however, which is often the case, the outer surface of the inner layer of the shell, when examined under a lens is seen to be marked with crowded radiating striæ which are too minute to be visible to the naked eye.

Length of an average specimen seventeen millimetres: greatest height of the same, nine mm.: maximum thickness, nine mm.

East end of Maud Island: four specimens with both valves.

Oxytoma mucronata, Meek.

Plate 31, fig. 9.

Pteria (*Oxytoma*) *Munsteri*, Meek and Hayden. —1864. Palæontology of the Upper Missouri, p. 80, wood cuts, figs. A, B.

Avicula (*Oxytoma*) *mucronata*, Whitfield. —1876. Palæontology of the Black Hills of Dakota, p. 357. pl. 4, figs. 1, 2.

East side of Alliford Bay, one left valve, which is figured. The same species also occurs in the Lower Sandstones, or sub-division E, of the South side of Maud Island.

The types of *O. mucronata* from the Black Hills of Dakota were originally regarded by Meek, though with much doubt, as possibly identical with the *Avicula Munsteri* of Brown and Goldfuss. Eichwald, however, in the Lethaea Rossica,* says that the sculpture of the left valve of *A. Munsteri* consists of from sixteen to eighteen radiating ribs, with intervals furnished with one to three radiating striæ, whereas in large left valves of *O. mucronata* from Maud Island the primary radia-

* Volume 2, page 594.

ting ribs are separated by wide and nearly flat interspaces, which latter are occupied with as many as eight or nine radiating raised lines, and this seems to be also the case with Meek's figured type of the same species.

In the writer's judgment, the present shell is more nearly allied to the *Avicula Cornueliana* of d'Orbigny, from the French Neocomian,* (which Stoliczka says is an *Oxytoma*) than it is to *A. Munsteri*.

Aucella Piochii. (Gabb.)

Inoceramus Piochii, Gabb. —1864. Palæontology of California, Vol. I, p. 187 pl. 25, fig. 173, (excl. fig. 174.)

Aucella Piochii, Gabb. —1869. Idem, Vol. II, pp. 194 and 247, pl. 31, figs. 92 *a–c*.

Since the first part of the present volume was published a very characteristic valve of this shell was discovered in Mr. Richardson's collection of fossils from the "Lower Shales" of Skidegate Inlet west of Alliford Bay. Although probably only a variety of the *Aucella Mosquensis* of Von Buch, if indeed it is sufficiently different therefrom to rank even as a variety, the occurrence of a specimen of the true *A. Piochii* at this horizon is of considerable interest and worthy of being placed upon record, as throwing some light on the stratigraphical position of the deposit in which it was found.)

Melina Skidegatensis. (N. Sp.)

Melina mytiloides? Lamarck. This volume, pages 80–82, woodcuts, figs. 8 a, b. c, d.

South side of Alliford Bay, in Skidegate Inlet: six large specimens.

The shells described and figured in the first part of this volume, and there regarded, though with much hesitation, as possibly varieties of the *Perna mytiloides* of Lamarck, are now believed to be perfectly distinct.

They appear to belong to a previously undescribed species, for which the name given above is suggested, and to be perhaps most nearly allied to the *Perna Fittoni* of Pictet and Campiché,† from the Lower Greensand of the Isle of Wight and the Gault of Switzerland.

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* Paléontologie Française, Terrains Crétacés, Vol. 3, p. 471, Atlas, pl. 389, figs. 3 and 4.

† Paléontologie Suisse. Fossiles de Ste. Croix. Vol. 4, p. 95, pl. 157, fig. 2.

INOCERAMUS MORESBYENSIS. (Nom. Prov.)

Fig. 11. *Inoceramus Moresbyensis.* Outline of an imperfect left valve to shew the alation of the hinge line behind the beaks.

Shell moderately convex in front, especially in the umbonal region, and obliquely compressed behind : posterior dorsal margin abruptly inflected. Height somewhat greater than the length, greatest length just below the winged expansion of the hinge-line above : anterior margin shallowly concave immediately under the beaks and somewhat convex below : ventral margin rounded narrowly in front and obliquely as well as more broadly so behind : posterior margin obliquely convex below, straighter and widening outwards above. Hinge margin apparently ascending above, behind the beaks, in such a manner as to form a thin alate prominence or expansion whose exact outline is not known but whose posterior margin seems to have been obliquely truncated or subtruncated : beaks anterior, terminal, curved inwards and forwards.

Surface marked with numerous, very irregular and rarely continuous subconcentric plications.

North shore of Cumshewa Inlet, Moresby Island : a few imperfect specimens.

This singular shell, whose characters cannot be very satisfactorily defined with the material at the writer's disposal, appears to belong to that section of the genus of which *Inoceramus alatus*, Goldfuss,* is the type. Judging partly by the figure in the "Petrefacta Germaniæ," and partly by the description ("costis concentricis crassis regularibus") it would seem that the *I. alatus* has much broader and more regularly disposed concentric folds than the present species.

Inoceramus concentricus, Parkinson.

For the synonymy of this well known species, see page 79 of the present volume.

North shore of Cumshewa Inlet, one specimen: Skidegate Inlet, at Bear Skin Bay (one specimen), and very abundant at South Island.

Inoceramus (Actinoceramus) sulcatus, Parkinson.

Plate 32, figs. 3 & 3a.

Inoceramus concentricus,	Parkinson.	—1820.	Transactions of the Geological Society of London. Vol. 5, p. 59, pl. 1, fig. 5.
"	" Sowerby.	—1821.	Mineral Conchology, pl. 306, figs. 1-5.
"	" Goldfuss.	—1836.	Petrefacta Germaniæ, page 112, pl. 110, fig. 1.
"	" d'Orbigny.	—1845.	Paléontologie Française, Terrains Crétacés, Vol. 3, p. 504, pl. 403, figs. 3-5.
"	" Pictet & Campiché.	—1869-71.	Paléontologie Suisse, Fossiles de Sainte Croix, Vol. 4, p. 105; which see for a more extended synonymy of the species.

Very abundant at and around Bear Skin Bay, on the Graham Island side of Skidegate Inlet, where thirty-eight good specimens were collected.

In describing this species d'Orbigny says (op. cit. p. 504) that it has seven or ten radiating ribs, but in the Queen Charlotte Island specimens collected by Dr. Dawson the maximum number of ribs is from seven to eight, there are frequently only three and sometimes they are almost obsolete. Pictet, however, in speaking of the ribs of this shell

* Petrefacta Germaniæ. Vol. 1, Divisio Quarta, p. 116, pl. 112, fig. 3.

(op. cit., p. 106,) says, "leur nombre plus frequent est de sept à huit," and adds, "nous avons sur les yeux des echantillons à cinq côtes, et plusieurs même à trois."

Camptonectes curvatus, Geinitz.

Plate 32, fig. 4.

Pecten curvatus, Geinitz.		—1843. Kieslingsw, p. 16, pl. 3, fig. 13.
" " "		—1848. Quadersandstein, p. 180.
Pecten virgatus, d'Orbigny.		—1845. Paléontologie Française, Terrains Crétacés, Vol. 3, p. 602, pl. 434, figs. 7-10, as of Nilsson, but not *P. virgatus* Nilsson.
Pecten (*Camptonectes*) *curvatus*, Stoliczka.		—1871. Palæontologia Indica, Cephalopoda of S. India, Vol. 3, p. 433, pl. 31, figs. 15-16, and pl. 41, figs. 433.
?.=*Camptonectes extenuatus*, Meek.		—1865. Palæontology of the Upper Missouri, p. 78, pl. 3, fig. 6.
" " "	Hall and Whitfield.	—1877. United States Geological and Geographical Exploration of the Fortieth Parallel, Vol. 4, p. 290, pl. 7, fig. 18.
" " "	Whitfield.	—1876. Palæontology of the Black Hills of Dakota, p. 353, pl. 4, figs. 4, 5.

East end of Maud Island, a single right valve. Judging by the figures and descriptions only it is very difficult to see how the *Camptonectes extenuatus* of Meek is to be distinguished from the *C. curvatus* of Geinitz, assuming that Dr. Stoliczka's synonomy of the latter species is correct, which the writer has no reason to doubt.

Amusium lenticulare. (Nom. Prov.)

Plate 32, fig. 5.

Shell strongly compressed, thin, lenticular; outline as viewed laterally nearly circular, the length and height being very nearly equal: anterior, posterior and basal margins regularly rounded; beaks small, prominent, erect, appressed and central; superior border, exclusive of the ears, descending obliquely, rather rapidly and somewhat concavely on both

sides : ears of the upper or left valve equal in size and similar in shape, ascending obliquely outwards from the beak and truncated also obliquely at the outer margins. Ears of the under or right valve unknown.

Surface of the upper valve polished and nearly smooth to the naked eye, but when examined with a moderately powerful simple lens it is seen to be marked with exceedingly numerous, minute and very closely disposed concentric striæ, also by very faint and somewhat more distant radiating lines. Test extremely thin.

Maximum length of the most perfect valve, forty-two millimetres : height of the same, as measured from the beak to the centre of the basal margin, forty-five mm.

North Shore of Cumshewa Inlet : two or three specimens in a concretionary nodule of shale.

This shell may be a mere variety of the *Camptonectes bellistriatus* of Meek, (see Palæontology of the Upper Missouri, page 77) but the upper margins of the ears of its right valve are ascending and not straight.

OSTREA SKIDEGATENSIS. (Nom. Prov.)

Plate 32, fig. 1.

Ostrea. (Sp. Undt.) This volume, page 83.

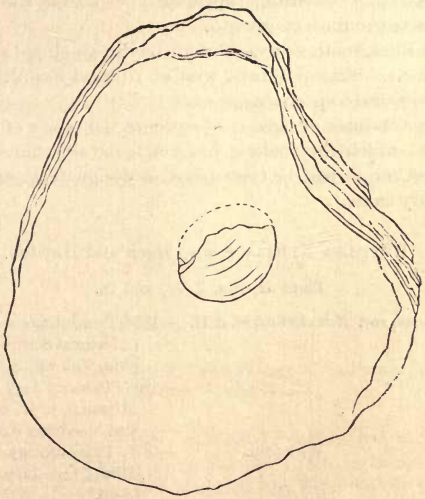

Fig 12. *Ostrea Skidegatensis.* Outline of the interior of an upper valve of a separate specimen.

Shell or shells either single and separate or aggregated into clusters of two or three individuals: relative convexity of the two valves variable: shape irregular. Lower valve shallowly convex; upper valve usually flatter and sometimes a little concave. Lateral outline variable in different individuals, no two being alike: as a rule though the single specimens are higher than long, and the clustered individuals are longer than high, while the narrowest part of the valves in all is, as is customary in the genus, at the short hinge line. Thus, of the single or separate specimens some are narrowly elongated in the direction of their height, their dorso-ventral diameter being nearly twice as great as that from the buccal to the anal side, and the two sides are nearly parallel, while others are more or less triangular in their contour and widen out gradually towards the pallial border, though in these also the dorso-ventral diameter somewhat exceeds the maximum length. In clustered specimens, on the other hand, the valves often expand broadly, irregularly and laterally at a short distance from the hinge line, and the buccal margin is broad and nearly straight: in such individuals the length is nearly twice as great as the maximum height, and the greatest length is a little below the middle, as in the original of fig. 1 on plate 32.

Muscular scar large, reniform or subovate, situated near to the buccal margin and about half way between the cardinal and pallial borders.

Surface markings consisting apparently of coarse and irregularly disposed concentric lines of growth.

Skidegate Inlet, south side of Alliford Bay: two single and two clustered specimens. Skidegate Inlet west of Alliford Bay, J. Richardson, 1872: three separate specimens.

The affinity of these oysters is obscure, as the range of variation of the species to which they belong has yet to be ascertained. For the present, however, it will be convenient to designate them by a local and temporary name.

Gryphæa Nebrascensis, Meek and Hayden.

Plate 32, figs. 2, 2*a*, and 2*b*.

Gryphæa calceola, var. Nebrascensis,			M. & H.	—1861. Proceedings of the Academy of Natural Sciences of Philadelphia, Vol. xiii. p. 437.
"	"	"	"	—1865. Palæontology of the Upper Missouri, p. 47, pl. 3, figs. 1*a–e*, and woodcuts A.B.C.D.
"	"	Whitfield.		—1876. Palæontology of the Black Hills of Dakota, p. 349, pl. 3. figs. 13–16.

(Perhaps a variety of *Gryphæa vesiculosa,* Sowerby.

Compare especially Pictet and Campiche's description and figures of that species in the "Paléontologie Suisse, Fossilés du Terrain Crétacé des environs de Sainte-Croix, 4me. partie," p. 311, pl. 194, figs. 1–6.)

East end of Maud Island, very abundant: South side of Alliford Bay, three good specimens.

The convex valve of the *Gryphæa* from the above mentioned localities, which is the one most commonly preserved, is very variable in its shape and surface ornamentation. In most of the specimens of the larger valve collected by Dr. Dawson the beak is acute, but in others the umbo is distinctly truncated and shows a scar of attachment. The convex valve of some individuals again is evenly rounded on the back and entirely devoid of longitudinal grooves or furrows, but in others the corresponding valve is impressed by a single sulcus, or by two, and in one instance by as many as three radiating and widely distant sulci. The surface of all the specimens of the convex valve collected at the Queen Charlotte Islands is marked by flexuous and concentric lines of growth, but in some the umbonal region is marked also by irregular longitudinal striæ which (as Prof. Whitfield remarks, op. cit. p. 349), "continue to below the middle of the valve," while in others the longitudinal striæ are altogether absent.

The specimens in which the longitudinal striæ are well shown agree perfectly with the descriptions and figures of *Gryphæa Nebrascensis* by the authors above cited, but others in which those striæ are absent can scarcely be distinguished from the *G. vesiculosa* as described and figured by Pictet & Campiché.

Mr. Meek regarded the *G. Nebrascensis* as probably a variety of the *G. calceola* of Quenstedt, but for the reasons just stated it seems quite as likely that it will prove to be conspecific with the *G. vesiculosa* of Pictet & Campiché, if not with the true *G. vesiculosa* of Sowerby.

BRACHIOPODA.

(?) Terebratella obesa, Gabb.

Terebratella obesa, Gabb. ..1864. Palæontology of California, Vol. 1, p. 205, pl. 26, figs. 194 and 194*a*, *b*.

South side of Alliford Bay: one nearly perfect but partly exfoliated dorsal valve, which measures about twenty mm. in breadth by thirteen in length, and whose surface is marked by from twenty to twenty-two subangular ribs, also a smaller example with both valves, but with the

beak of the ventral valve broken off. North side of Maud Island, a young but tolerably perfect specimen.

The Alliford Bay specimens correspond very well with the California types of *T. obesa* in the great convexity of the valves, in being much broader than long, and in being marked with a corresponding number of radiating ribs. The small example from Maud Island looks more like a *Rhynchonella* than a *Terebratella*, but the same remarks would apply to Mr. Gabb's figures of *T. obesa*.

ANTHOZOA.

Astrocœnia irregularis. (N. Sp.)

Plate 33, fig. 1.

Corallum compact, massive, irregular in shape: corallites contiguous, polygonal and mostly hexagonal, averaging from four to five millimetres in diameter: septa arranged obscurely in three cycles and of different length in each: primary septa six, extending from the periphery to the columella: secondary septa six also, but not quite so long as the primaries: between the primaries and secondaries their intervenes a third cycle of twelve short irregular septa: upper and outer edges of the septa, as seen in the calyces, apparently granular; columella styliform, more or less conspicuous in the centre of each calyx but not very prominent: calyces shallow, about one mm. in depth.

South side of Maud Island, two specimens, one of which has been burrowed into by a Lithodomus. The same species was collected by Mr. James Richardson in 1872 in Skidegate channel, west of Alliford Bay.

This coral resembles the *Astrocœnia Reussiana* of Stoliczka * in the number and disposition of its septa, but the corallites of *A. irregularis* are contiguous and from four to five mm. in breadth, whereas those of *A. Reussiana* are said to be distant and only from one to two mm. in breadth.

* Palæontologia Indica, Cretaceous Fossils of S. India. Vol. 4, pt. 4, p. 28, pl. v. figs. 3-5.

4.—From the "Agglomerates," or Subdivision D. of Dr. G. M. Dawson's report.

The only fossils collected from these rocks are three fragments, apparently of the shells of Lamellibranchs, one of which looks rather like a piece of the exfoliated valve of an *Ostrea*, but the specimens are far too imperfect to admit of their specific relations being ascertained.

5.—From the "Lower Sandstones," or Division E. of Dr. G. M. Dawson's Report.

CEPHALOPODA.

Schloenbachia propinqua. (N. Sp.)

Plate 33, figs. 2, 2*a*, 2*b*, and 2*c*.

Shell thin, strongly compressed at the sides, and distinctly keeled on the periphery: maximum thickness about one-fifth of the greatest diameter. Whorls about four, increasing rather rapidly in size in the dorso-ventral direction, but very slowly at the sides: umbilicus about one-third or more than one-third of the maximum diameter, with gently sloping and obliquely convex sides: keel prominent, simple in the largest individuals but more or less crenate in young specimens: aperture nearly twice as high as wide, flattened at the sides, narrowly subelliptical in outline, but emarginated below, though not deeply, by the encroachment of the preceding volution.

Surface marked by numerous and rather crowded flexuous costæ which extend from the umbilical margin to the keel and which are most prominent on the outer half of the sides. In very young specimens the ribs pass over the keel, but in larger ones they are distinctly interrupted or cut through by it. Outer lip broadly concave at the sides and produced on the periphery into an obtusely pointed beak, whose lateral margins are obliquely concave. Septation unknown.

Dimensions of the largest specimen, not counting fragments: maximum diameter forty-nine millimetres: greatest breadth or thickness, ten mm.: width of umbilicus, as measured from suture to suture, eighteen

mm.: height of aperture, nineteen m.m.: maximum width of the same, ten mm.

South side of Maud Island, seven small specimens, the largest of which is not more than twenty millimetres (or a little more than three quarters of an inch) in its greatest diameter. East side of South Bay, in Skidegate Inlet ("probably from Subdivision E." Dr. G. M. Dawson) two specimens, one of which is the largest tolerably perfect one that has yet been obtained.

At the last mentioned locality a large fragment of one of the whorls of this species was collected which shows that the specimen when entire must have been fully four inches in its greatest diameter. The ribs on this fragment are fully five mm. apart, and there are no crenations on its keel. At the South end of Maud Island, associated with the more normal form, there occurs a variety which has a proportionately narrower umbilicus, with somewhat steeper sides, but this variety does not seem to be constant in its characters but to merge gradually into the more typical form.

Young specimens of the present species and of the *Ammonites cordiformis* of Meek and Hayden,* of about three quarters of an inch in diameter, or a little more, are exceedingly alike, but at a slightly advanced stage of growth, the former does not increase much in thickness, and its keel becomes simple and entire, whereas the latter increases very rapidly in thickness as it grows older, and its keel is always serrated.

It is not without precedent for a species of *Schloenbachia* to have a crenate keel in its young state and a simple keel when older, for Stoliczka says that this is the case with his *Ammonites Blandfordianus*,† which Neumayr places in the genus *Schloenbachia*.

Sphenodiscus Requienianus ? d'Orbigny.

Plate 22, figs. 4 and 4*a*.

Ammonites Requienianus, d'Orbigny. —1840. Paléontologié Française, Terrains Crétacés, Vol. 1, p. 315. pl. 93.

South side of Maud Island: a badly preserved cast, which agrees very well, on the whole, with d'Orbigny's description and figures of the above named species, but as the septation is not visible in the specimen collected by Dr. Dawson and as its outer edge is so much water-worn as to obscure the true characters of the periphery, its identity with *A. Requienianus* is rather suggested as possible than decidedly affirmed.

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* See Plate 5 of the "Palæontology of the Upper Missouri," figs. 2*d* and 2*e*.

† Palæontologia Indica. Cretaceous Fossils of S. India, Vol. 3, p. 46.

GASTEROPODA.

Pleurotomaria Skidegatensis, Whiteaves.

Pleurotomaria Skidegatensis. —1876. This volume, p. 51, pl. 9, figs. 6 and 6*a*.

South side of Maud Island: one imperfect and badly preserved but characteristic specimen.

Cinulia. (Species Undeterminable.)

South side of Maud Island: a cast of the body whorl and part of the preceding volution of a subcylindrical and apparently undescribed species with a rather long spire. Very similar specimens, which probably belong to the same species, were collected in the Lower Shales of Skidegate Inlet by Mr. James Richardson in 1872.

LAMELLIBRANCHIATA.

Pleuromya subcompressa, Meek, var. lævigata.

Plate 33, fig 3.

For the synonymy of this shell see page 222.

South side of Maud Island, one very perfect and undistorted cast and a fragment of another. The best specimen from this locality differs a little from the smooth forms of *P. subcompressa* collected from the Lower Shales of Alliford Bay and described on page 224, in being proportionately broader in the direction of their height and in not being so angular on the anterior and posterior umbonal slopes.

A precisely similar example to the one from Maud Island was collected by Mr. G. M. Dawson at the Iltasyouco River in 1876.

Cardium tumidulum. (N. Sp.)

Plate 33, fig. 4.

Shell extremely small for the genus, strongly convex and very tumid in the middle, obliquely compressed at the sides, especially above: greatest thickness through the closed valves about equal to their maxi-

mum length. Valves subovate in outline as viewed laterally, somewhat oblique in some specimens but nearly equilateral in others; higher than long and longest immediately below the middle or near the base: anterior and ventral margins rounded: posterior margin either rounded or obliquely subtruncated and obtusely subangular at its junction with the ventral border below: cardinal border very short, and nearly straight on each side of the beaks, but with its outer angles more or less rounded off: umbones angular behind, subcentral, very broad, gibbous and prominent: beaks curved strongly inwards, downwards and a little forwards: posterior area indistinctly defined.

Entire surface covered with minute and closely arranged radiating ribs. Hinge teeth and muscular impressions unknown.

Dimensions of an average specimen: maximum length, five millimetres and a half: greatest height, six mm.

South side of Maud Island: six badly preserved single valves.

Judging by its external characters alone, it is not at all unlikely that this shell may prove to be a species of *Cardilia* (Deshayes), though that genus has not yet been recorded as occurring in rocks of Cretaceous age. In any case the present species is not a true *Cardium* in the most restricted sense of the word. It may be an extreme variety of the *Protocardium Shumardi* of Meek and Hayden, which latter will be found described and figured on pages 98–99 of the "Palæontology of the Upper Missouri."

PROTOCARDIUM. (Species undeterminable.)

Plate 33, fig. 5.

South side of Maud Island: a small but perfect cast of a species of *Protocardium*, whose specific relations cannot at present be determined. Its posterior area is marked with rather coarse radiating ribs and the rest of the shell seems to have been concentrically striated.

NEMODON FISCHERI, d'Orbigny. (Sp.)

The synonymy of this shell will be found on page 234.

South side of Maud Island: a cast of a left valve.

LITHODOMUS MAUDENSIS, Whiteaves.

South side of Maud Island: two single valves of a shell which appear to be precisely identical with the species from the "Lower Shales" of the same Island, described on pages 237 and 238 of the present volume.

Oxytoma mucronata, Meek and Hayden.

Plate 33, figs. 6, 6*a*, and 6*b*.

South side of Maud Island; several good specimens of both valves. For critical comments on the characters of this species, with reference to the publications in which it is described, see page 238, ante.

Lima. (Species undeterminable.)

South side of Maud Island: three casts of the left valve of a small, obliquely and narrowly subovate, ribbed species of Lima.

The shell appears to have been rather strongly convex, the front margin is subangular in the middle in one of the specimens and the ears are small. The surface of the central area of the cast is marked by ten radiating ribs, with indications of a minute secondary rib intercalated between each pair of the larger ones, but the outer portions of the anterior and posterior sides are smooth.

Pecten Carlottensis. (N. Sp.)

Plate 33, fig. 7.

Shell compressed, thin, and ovately orbicular, a little higher than long, margin of the valves rounded at and below the middle, narrowing abruptly, obliquely and somewhat concavely under the ears above: shape of the ears not very perfectly known: those of the right valve appear to be small, and unequal in size, the right being rather the larger of the two, triangular, straight above and truncated almost at a right angle at the sides.

Surface marked by about thirty very flat radiating ribs of unequal breadth, which are crossed by minute, exceedingly numerous and densely crowded raised lines, or narrow and acute ridges. The radiating ribs are nearly obsolete in the umbonal region, but are strongly marked on the lower half of the valves, and are separated by narrow and not very deep grooves.

Dimensions of one of the most perfect specimens (the one figured): length, eighteen millimetres: height, twenty.

South side of Maud Island: apparently abundant, but the specimens although well preserved are most of them very fragmentary.

BRACHIOPODA.

Rhynchonella Maudensis. (N. Sp.)

Plate 33, figs. 8, 8*a* and 8*b*.

Shell small, moderately convex, the maximum thickness through the closed valves being usually about one-third less than their greatest breadth: length and breadth nearly equal in most specimens but in others the breadth slightly exceeds the length; outline varying from rounded subtrigonal or broadly and longitudinally subovate to subpentagonal and somewhat transversely elongated: front margin more or less truncated or shallowly emarginated.

Ventral valve tumid in the centre above, and contracting rather suddenly into a broad and not very deep mesial sinus below: beak of the same valve small and pointed, curved inward over that of the dorsal: area small and narrow. Dorsal valve also gibbous and tumid in the umbonal region above, convexly, obliquely and abruptly inflected on both sides of the mesial fold below.

Surface marked with sharply angular, or subangular radiating simple ribs, which extend from the beaks to the anterior and lateral margins. On the ventral valve there are from four to six ribs on the sinus, and seven or eight on each side, while on the dorsal there are from five to seven on the fold, and seven or eight on each side.

Dimensions of a perfect specimen of average size: length eleven millimetres: breadth, eleven: maximum thickness, seven mm. Some individuals are not quite one mm. broader than long, and in others the thickness is equal to nearly one-half the maximum breadth.

South side of Maud Island, abundant and in good condition.

An interesting little shell, which may prove to be only a small local variety of the *R. gnathophora* of Meek. *

Discina semipolita. (N. Sp.)

Plate 33, figs. 9 and 9*a*.

Shell, (or rather upper valve, for the under or attached valve is unknown) depressed conical: height from apex to base about one-half or a little less than one half the greatest breadth of the base: outline of

* Palæontology of California, Vol. 1, p, 39. pl. 8, figs. 1 and 1 *a—f*.

base subcircular or ovately-subcircular, the posterior end being usually a little broader than the anterior, and sometimes nearly straight or faintly emarginate in the centre. Apex erect, obtuse in some specimens and more acute in others, subcentral but always placed a little behind the middle and sometimes as far back as half-way between the middle of the valve and the posterior margin.

Surface polished and shining to the naked eye, but when examined with a somewhat powerful simple lens it is seen to be marked with numerous minute and concentric laminar striæ, and there are traces also of still more minute radiating lines. Test very thin.

Muscular impressions very indistinctly defined: under a lens they appear to consist of two somewhat reniform or arcuate scars, one on each side of the apex, which seem to be divergent posteriorly and convergent anteriorly, though they do not appear to meet in front.

Length of the most perfect specimen figured, seven millimetres: greatest breadth of the same, six mm. and a-half: approximate height, three mm.

South side of Maud Island: eight upper valves, or casts of the upper valve.

As the number and shape of the muscular scars on the interior are by no means clearly apparent, it is just possible that this shell may be a *Helcion*, but its character, on the whole, are much more like those of a *Discina*.

GENERAL CONCLUSIONS.

1. The Upper Shales and Sandstones, or Subdivision A.

These rocks, which so far as known contain *Inoceramus problematicus* only, probably represent the lowest division of the Upper Cretaceous.

2. The Coarse Conglomerates, or Subdivision B.

No fossils that can be identified specifically have yet been collected from these deposits, but from their stratigraphical position they may be presumed to be synchronous with the Upper Greensand, or Craie Chloritée of the French Geologists, and with the Shales and Sandstones of the "Dakota Group."

3. The Lower Shales, or Subdivision C.

The Lower Shales are remarkable not only for the occurrence in them of anthracite coal and clay ironstone, but also for the abundance and great variety of the fossils which they contain. As the fossils collected by Dr. Dawson are not all from precisely the same geological horizon in these shales, it will be desirable to give a list of the species from each locality before discussing the probable age of the series as a whole.

A.—From Cumshewa Inlet.

No. 1. "Fossils from the Peninsula, north shore of Cumshewa Inlet and at different places a few miles west of the Peninsula. All from about the same geological horizon, which is supposed to represent subdivision C of the Skidegate section." (Dr. G. M. Dawson.)

Spiroceras Carlottense.
Lytoceras Sacya.
" Timotheanum.
Haploceras Perezianum.
" Beudanti (abundant.)
" planulatum.
" Cumshewaense.
Ancyloceras Rémondi.
Hamites glaber.
Teredo Suciensis.
Trigonia Maudensis.
Arca, like grammatodon inornatus.
Inoceramus Moresbyensis.
" concentricus,
Amusium lenticulare.

No. 2. "Fossils from the lowest beds recognized at Cumshewa." (G. M. D.)

Haploceras Perezianum.
Yoldia arata.
Trigonia Maudensis.
Amauropsis tenuistriata.

B.—From Skidegate Inlet.

No. 3. "From Shingle Bay: probably from subdivision C." (G. M. D.)

Lytoceras Sacya.
Haploceras Beudanti.
Amauropsis tenuistriata.
Mytilus lanceolatus.

No. 4. "From the east side of Welcome Point: probably C." (G. M. D.)

Lytoceras Sacya.

No. 5. "From shore one mile and three quarters south-west of Welcome Point: probably C." (G. M. D.)

Nautilus Suciensis.
Lytoceras Sacya.

No. 6. "From Bear Skin Bay: C." (G. M. D.)

Schloenbachia inflata.
Lytoceras Batesi.
" Timotheanum.
Martesia carinifera.
Corbula concinna.
Thracia semiplanata.
Tellina Skidegatensis.
Thetis affinis.
Callista subtrigona.
Trigonia diversicostata.
Nucula (Acila) truncata.
Yoldia arata.
Inoceramus concentricus.
Actinoceramus sulcatus.

No. 7. "From the east side of Alliford Bay: near base of C." (G. M. D.)

Belemnites (densus, var.) Skidegatensis.
Astarte Packardi. Very large.
Oxytoma mucronata.

No. 8. "From the south side of Alliford Bay: near base of C." (G. M. D.)

Belemnites Skidegatensis.
Olcostephanus Loganianus.
Corbula concinna.
Thracia semiplanata.
Pleuromya subcompressa. Type.
" " var. Carlottensis.
" " var. lævigata.
Callista subtrigona.
Cyprina occidentalis.
Protocardium Hillanum?
Astarte Packardi.
Trigonia Dawsoni.
Nucula solitaria.
Grammatodon inornatus.
Melina Carlottense.
Ostrea Skidegatensis.
Gryphœa Nebrascensis. (Or G. vesiculosa.)
? Terebratella obesa.

No. 9. "From the east end of Maud Island: base of C." (G. M. D.)

Sphenodiscus Maudensis.
Perisphinctes Skidegatensis.
Nerinæa Maudensis.
Cerithium Skidegatense.
Vanikoro pulchella.
Calliostoma constrictum.
Trochactæon cylindraceus.
Pleuromya subcompressa, var. Carlottensis.
" " var. lævigata.
Protocardium Hillanum?
Astarte Packardi.
Nemodon Fischeri.
Trigonoarca tumida.
Modiola (Volsella) subimbricata.
Lithodomus Maudensis.
Camptonectes extenuatus. (Or C. curvatus.)
Gryphœa Nebrascensis. (Or G. vesiculosa.)

No. 10. "From the north side of Maud Island: C." (G. M. D.)

Periploma cuspidatum.
Tellina Skidegatensis? var.
Trigonia Maudensis.

No. 11. "From South Island: C." (G. M. D.)

Haploceras Perezianum.
" Timotheanum.
Stephanoceras cepoides.
Amauropsis tenuistriata.
Cinulia pusilla.
Thracia semiplanata.
Trigonia Maudensis.
Yoldia arata.
Inoceramus concentricus.

No. 12. "From Hooper's Creek Tunnel: (G. M. D.)

Unio Hubbardi.

No. 13. "From Coal Locality, south side of Skidegate Channel: base of C." (G. M. D.)

Belemnites densus.

No. 14. "From Bay east of Alliford Bay: (G. M. D.)

Amauropsis tenuistriatus.
Nucula (Acila) truncata.

No. 15. "From the south side of Maud Island: base of C." (G.M.D.)

Astrocœnia irregularis.

On the evidence afforded by the fossils as well as on stratigraphical grounds it would appear that the rocks at both localities in Cumshewa Inlet and at Nos. 3, 4, 5, 6, 10, 11 and 14 in Skidegate Inlet are unquestionably Cretaceous; that they represent the lower half of the Middle Cretaceous, and that they are as nearly as possible the exact equivalents of the Gault of Europe.

At these localities the Lower Shales contain, among others, the follow-

ing European Middle Cretaceous species, most of which are eminently characteristic of the Gault:—

Schloenbachia inflata, Sby.
Haploceras Beudanti, Brngt.
" planulatum, Sby.
Lytoceras Timotheanum, Mayor.
Thetis (major, var.) affinis.
Mytilus lanceolatus, Sby.
Inoceramus concentricus, Park.
Actinoceramus sulcatus, Park.

And probably

Camptonectes curvatus, Gein. & Gryphæa vesiculosa, Sby.

As might be expected, under the circumstances, some of the fossils of the Lower Shales range downwards into the Upper Neocomian or latest division of the Lower Cretaceous, while others extend upward into the Upper Cretaceous.

Those species which have the downward range indicated are,—*Ancyloceras Rémondi*, Gabb: *Aucella Piochii*, Gabb, which latter though rare in the Lower Shales of Skidegate Inlet is abundant in the Upper Neocomian of the mainland of British Columbia: *Nemodon Fischeri*, d'Orbigny, a Russian Neocomian fossil: and *Syncyclonema Meekani*, Wh., which is found also in the upper Neocomian of the valley of the lower Fraser river, B.C.

Those which range upwards into the Upper Cretaceous are *Nautilus Suciensis* and *Teredo Suciensis*, Whiteaves, both of which occur also in the Upper Cretaceous of the Sucia Islands, also *Nucula (Acila) truncata*, *Nucula solitaria and Terebratella obesa* of Gabb, which were originally described from the Chico Group of California.

Two species which have been described and figured by Stoliczka in his Cretaceous Fauna of Southern India, viz., *Ammonites Sacya*, Forbes, which Neumayr says is a *Lytoceras*, and *Trochactæon cylindraceus*, Stoliczka, are abundant in the Lower Shales of Cumshewa and Skidegate Inlets, the former at four localities, viz., Nos. 1, 3, 4 and 5, the latter so far as known, at Maud Island only, or No. 9.

Some of the fossils of the Lower Shales occur also in the "Shasta Group" of California. These are *Ammonites Batesi*, Trask, which is a *Lytoceras: Ammonites Breweri*, Gabb, which is a *Haploceras: Ammonites Stoliczkanus*, Gabb, which is most likely a *Hoplites: Ancyloceras Rémondi*, Gabb: *Aucella Piochii*, Gabb: and probably also *Pleuromya papyracea*, Gabb.

In a paper "on the Lower Cretaceous Rocks of British Columbia," which was published in the first volume of the Transactions of the Royal Society of Canada, the writer endeavoured to show that the

"Shasta Group" of the Californian geologists is separable, on palæontological grounds, into two well-marked divisions, one of which represents the Upper Neocomian and the other the Gault of Europe. The localities in British Columbia at which these supposed Upper Neocomian rocks occur, and a list of the fossils of the latter, with descriptions of three new species, are given in the paper cited. On the Pacific Coast of the United States and Canada the most characteristic fossils of the equivalents of the Upper Neocomian appear to be the *Belemnites impressus*, *Ancyloceras percostatus* and *Aucella Piochii* of Gabb, which latter shell is almost unquestionably synonymous with *A. Mosquensis* Von Buch, of the Russian Neocomian.

The Gault of Europe seems to be represented in America, not only by the Lower Shales of the Queen Charlotte Islands, as already suggested, but also by the fossiliferous porphyrites and felsites of Sigutlat Lake and the Iltasyouco river, B.C. (which were formerly supposed by the writer to be of Jurassic age) and by those Californian rocks which were formerly included in the Shasta Group and which hold such fossils as *Lytoceras Batesi*, *Haploceras Breweri* and *Hoplites Stoliczkanus*.

At the base of the series, however, in Skidegate Inlet, at localities Nos. 7, 8, 9, 13 and 15, in rocks which, according to Mr. Richardson and Dr. Dawson form part of the Lower Shales, and associated with others that elsewhere occur mingled with purely Cretaceous types, there occur a few fossils which the writer has entirely failed to distinguish from the following species that have heretofore been regarded as Jurassic by American geologists.

Belemnites densus, Meek & Hayden.
Pleuromya subcompressa, Meek. (Several varieties.)
Astarte Packardi, White.
Grammatodon inornatus.
Modiola (Volsella) subimbricata, Meek.
Oxytoma Nebrascensis, Meek & Hayden.
Camptonectes extenuatus, M. & H.
Gryphæa Nebrascensis, M. & H.

Moreover, the *Vanikora pulchella* of the Lower Shales is possibly only a variety of *Lyosoma Powelli*, White: the *Cardium tumidulum* of the Lower Sandstones may be an extreme form of the *Protocardium Shumardi* of Meek and Hayden, while the *Rhynchonella Maudensis* from the same rocks is very likely only a small local variety of the *R. gnathophora* of Meek.

Further, the fossiliferous volcanic rocks of Sigutlat Lake and of the Iltasyouco River on the mainland of British Columbia (which are now believed by the writer to be of the same age as the Lower Shales, as the two formations contain seven species in common, namely, *Olcoste-*

phanus Loganianus, Pleuromya subcompressa, Astarte Packardi, Trigonia Dawsoni, Grammatodon inornatus, Camptonectes extenuatus and *Gryphæa Nebrascensis*) hold also *Modiola* (or *Volsella*) *formosa* of Meek and Hayden, and *Gervillia Montanaensis* of Meek.

The discovery in the Black Hills of Dakota of deposits which were supposed to be of Jurassic age, principally upon palæontological grounds, was first announced by Mr. F. B. Meek in 1858, and since that time numerous species of fossils from rocks of a similar geological horizon in Utah, Montana and other Western States and Territories, as well as in California, have been described by Mr. Meek, Professor R. P. Whitfield and Dr. C. A. White.

The reasons which induced Mr. Meek to regard certain strata in Utah and Dakota as Jurassic are clearly stated on pages 110 and 111 of Dr. Hayden's "Geological Report of the Exploration of the Yellowstone and Missouri Rivers" and elsewhere, but the conclusions at which Mr. Meek arrived, with the somewhat meagre material at his disposal, although such as any palæontologist would probably have come to under the circumstances, appears to the writer to be outweighed by the additional evidence afforded by the large collection of fossils since made by Mr. Richardson and Dr. Dawson at the Queen Charlotte Islands and on the mainland of British Columbia, which throw an entirely new light on the subject.

Throughout the Western States these supposed Jurassic rocks are everywhere stated to occupy a position immediately below the sandstones and conglomerates of the "Dakota Group" (which Meek maintains is the equivalent of the English Upper Green Sand) and as immediately above certain red beds which are generally believed to be Triassic. Wherever these ostensibly Jurassic rocks occur, therefore, it follows that part of the Mesozoic series is wanting, and it is difficult to understand why the Lower Cretaceous and earlier half of the Middle Cretaceous should always be missing and not the Jurassic.

As will be seen a little farther on, there are good reasons for supposing that the Agglomerates and Lower Sandstones of the Queen Charlotte Islands form part of the same formation as the Lower Shales, but, whether this be the case or not, the three together occupy almost exactly the same stratigraphical position as the supposed Jurassic rocks of the Western States. At Cumshewa and Skidegate Inlets the Lower Shales immediately underlie conglomerates which are probably synchronous, or nearly so, with those which almost invariably occur at the base of the "Dakota Group," and the Lower Sandstones are succeeded by Upper Triassic rocks, although the two latter are unconformable.

Turning next to the palæontological aspect of the question, Mr.

Meek's principal argument in favour of regarding the Dakota and Utah rocks as Jurassic is thus stated in that report of Dr. Hayden's to which reference has already been made. "The organic remains found in these series present, both individually and as a group, very close affinities to those in the jurassic epoch in the Old World; so close indeed, that in some instances, after the most careful comparisons with figures and descriptions, we are left in doubt whether they should be regarded as distinct species, or as varieties of well known European jurassic forms. Among those so very closely allied to foreign jurassic species may be mentioned an *Ammonite* we have described under the name of *A. cordiformis*, which we now regard as probably identical with *A. cordatus*, of Sowerby; a *Gryphæa* we have been only able to distinguish as a variety from *G. calceola*, Quenstedt; a *Pecten*, scarcely distinguishable from *P. lens*, Sowerby; a *Modiola*, very closely allied to *M. cancellata*, of Goldfuss; a *Belemnite*, agreeing very well with *B. excentricus*, Blainville, &c."

The strongest point in this argument is the fact first adduced, namely, the occurrence in the rocks in question of an Ammonite (*A. cordiformis* of Meek and Hayden) which seems to be an *Amaltheus* or a *Cardioceras*, and in either case is a species which is very closely related to the *Ammonites cordatus* of Sowerby from the European Jurassic. But, on the other hand, associated with purely Cretaceous types, the Lower Shales of Skidegate Inlet contain no less than four species of Ammonites which if submitted to any European palæontologist who had made a special study of the group, without shewing him any other fossils from the same rocks, would almost certainly be regarded as Jurassic. These are *Ammonites Richardsoni*, Whiteaves, which is a very typical representative of the *Coronarii* of Von Buch, and which therefore is probably a *Stephanoceras: Stephanoceras oblatum* and *S. cepoides*, whose relations to the Jurassic *Macrocephali* have been pointed out on pages 29, 30, 209 and 210 of the present volume; and *Perisphinctes* Skidegatensis, Whiteaves, which as Mr. E. Billings suggested, (on page 72 of the Report of Progress of the Geological Survey of Canada for 1872–73) is of the type of *P. tyrannus*, Neumayr, from the "Macrocephalen Kalken" of Brielthal.

In regard to the *Gryphæa Nebrascensis*, which Mr. Meek thought was possibly a variety of *G. calceola*, Quenstedt, the specimens from Skidegate Inlet shew that the irregular radiating striæ on the umbonal region of the convex valve are as often absent as present, and apart from this character it is difficult to see how the shells represented by Meek's woodcuts of *G. Nebrascensis* in the "Palæontology of the Upper Missouri" can be distinguished from the *G. vesiculosa* of Sowerby as figured by Pictet and Campiché.

The *Camptonectes bellistriatus* of Meek and Hayden, from the Black Hills of Dakota, looks more like a Cretaceous *Amusium* or *Camptonectes* than it does like the true *Pecten lens* of Sowerby, which latter species the writer has had abundant opportunities of studying in the field, in the Middle and Lower Oolites of the midland counties of England. *Camptonectes extenuatus* of Meek and Hayden, as figured by Prof. R. P. Whitfield in the "Palæontology of the Black Hills of Dakota," bears a remarkably close resemblance to the *C. curvatus* of Geinitz, from the Cretaceous rocks of Southern India, as described and illustrated by Stoliczka.

The *Modiola* (or *Volsella*) *formosa* of Meek and Hayden belongs to a persistent and recurrent section of that genus, which ranges from the Jurassic epoch into the recent period, and which is represented in northern seas by the *Modiolaria nigra* of Gray.

The very variable guards of Belemnites from the Black Hills and elsewhere, which Mr. Meek described provisionally under the name *B. densus*, may represent two or three species rather than one, and neither of them seem to present any special characters by which they can be distinguished as Jurassic species rather than Cretaceous.

Oxytoma mucronata, Meek, for reasons already stated on pages 238 239, appears to be more nearly related to the *O. Corneuiliana* of d'Orbigny, from the French Neocomian, than to the *O. Munsteri*, Goldfuss, of the Jurassic, and the typical form of the *Pleuromya subcompressa* of Meek, seems also to be barely separable from the *Pleuromya* (or *Panopœa*) *papyracea* of Gabb, from the "Shasta Group" of California.

From the foregoing considerations the writer has long held the opinion, first, that the whole of the Lower Shales at Cumshewa and Skidegate Inlets belong to about the same geological horizon as the Gault of England and Europe: and secondly, that there are now good reasons for supposing that many of those rocks in the Western Territories and California which have been hitherto regarded as Jurassic may prove to be more nearly the equivalents of the earliest or oldest subdivision of the Middle Cretaceous.

4. "The Agglomerates, or Subdivision D."

There is no palæontological evidence which would afford any clue to the probable age of the rocks of this subdivision.

5. "The Lower Sandstones or Subdivision E."

Fourteen species of fossils were collected by Dr. Dawson in these deposits, but three of the former are too imperfect to be determined. Of the eleven species which remain, five, namely, *Pleutomaria Skidegatensis*, *Pleuromya subcompressa, var. lævigata*, *Nemodon Fischeri*, *Oxytoma mucronata* and *Lithodomus Maudensis*, occur also in the Lower Shales, especially towards or at their basal portion: one is doubtfully identified with the *Ammonites Requienianus* of d'Orbigny, which is probably a *Sphenodiscus:* and five (viz., *Schloenbachia propinqua*, *Cardium tumidulum*, *Pecten Carlottensis*, *Rhynchonella Maudensis*, and *Discina semipolita*) are here described and figured as apparently new.

As nearly one-half of the species collected in subdivision E are also found in subdivision C, it is upon the whole most likely that the Lower Shales, the Agglomerates and Lower Sandstones of Dr. Dawson's report, are all merely local and subordinate subdivisions of the same formation, and that the three together represent the lower half of the Middle Cretaceous at this particular locality. It is to be noted, however, that the two Ammonites which occur in the Lower Sandstones are quite different from any of the species found in the Lower Shales.

ADDENDUM.

Trigonia intermedia, Fahrenkohl.

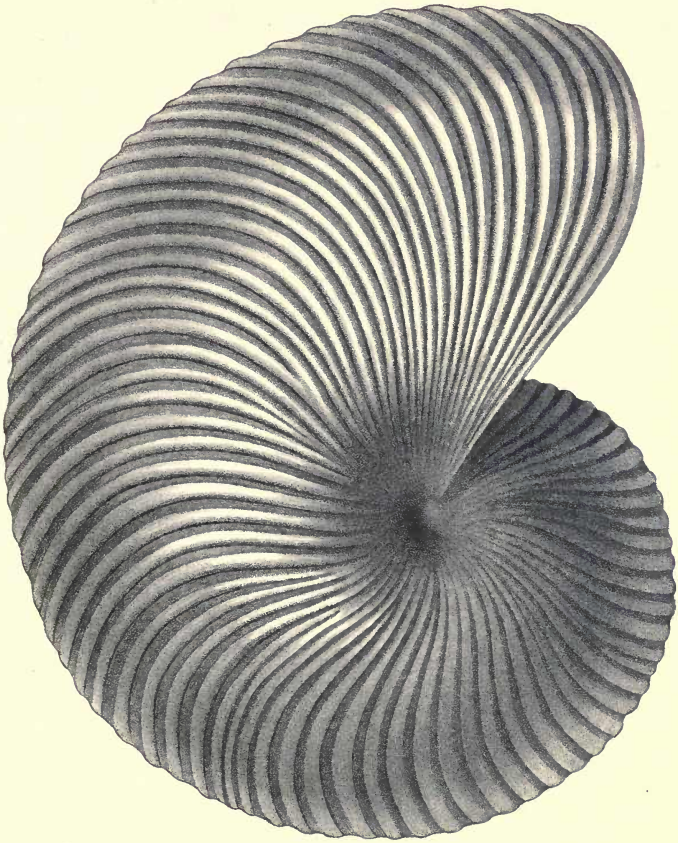
Lyriodon intermedium, Fahrenkohl.	—1841.	"Üb. einige Fossilien der moskausch u. kalug. Gouv. voy., Bull de Mosc." Vol. iv. p. 796, pl. 19, fig. 2.
Lyrodon clavellatus, G. de Fischer.	—1853.	Bull de Mosc, Vol. 1, p. 127.
Trigonia clavellata, d'Orbigny.		(En partie). Paléont. de Russie, &c., p. 460.
Trigonia intermedia, Eichwald.	—1867.	Lethaea Rossica, Vol. 2. Sect. 1, p. 601, pl. 24, figs. 13 *a* and *b*.
Trigonia Dawsoni, Whiteaves.	—1878.	Geol. Surv. Can., Rep. Progr. 1876-77, pp. 154 and 155.
" " Whiteaves.	—1884.	This Volume, p. 231, pl. 31, figs. 1 and 1*a*.

Since the third sheet of the present report was issued, the writer has ascertained that the *Trigonia Dawsoni* is almost certainly identical with the above named Russian Neocomian species.

PLATE XXI.

NATILUS SUCIENSIS, Whiteaves, (page 197).

Side view of a specimen from Skidegate Inlet.



A H Foord, del[t] J H Balbirnie, Lith. A Mortimer Imp[t]

PLATE XXII.

BELEMNITES DENSUS, Meek & Hayden, (page 194).

Figure 1. Side view of the only guard collected, from the south side of Skidegate Channel, which is thought to be probably referable to this species.

BELEMNITES SKIDEGATENSIS (page 195).

Figure 2. Specimen from Alliford Bay in Skidegate Inlet, showing the phragmocone in situ and a large portion of the guard.

" 2 *a*. Another example of the guard, also from Alliford Bay.

" 2 *b*. Ventral aspect of the same.

" 2 *c*. Natural transverse section of a specimen of the guard, not far from the apex of the phragmocone.

SPHENODISCUS MAUDENSIS (page 200).

Figure 3. Side view of the only specimen known, from the east point of Maud Island.

" 3 *a*. Outline of a transverse section of the same.

" 3 *b*. Portions of two septa of this species.

SPHENODISCUS REQUIENIANUS (?) d'Orbigny, (page 248).

Figure 4. Cast of the interior of a shell which is doubtfully referred to this species, from the south side of Maud Island.

" 4 *a*. Outline of the same, as viewed at a right angle to the last, to show the comparative thickness of the shell, the shape of its aperture and the characters of the periphery.

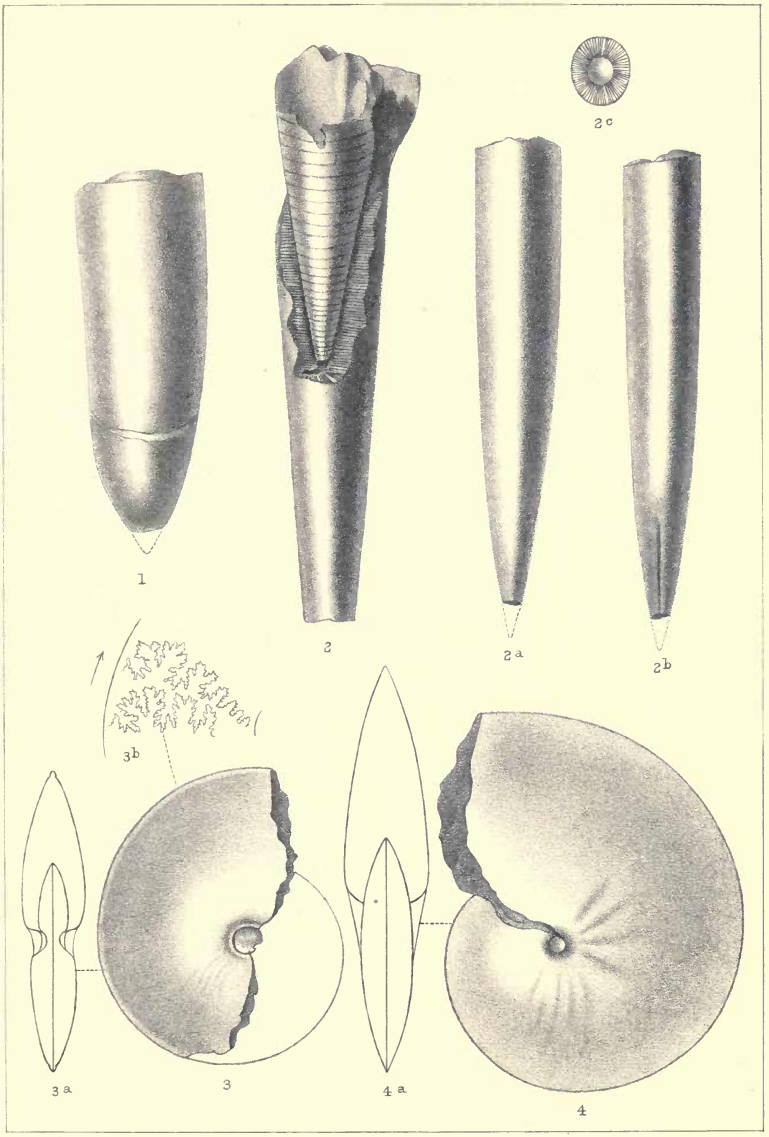


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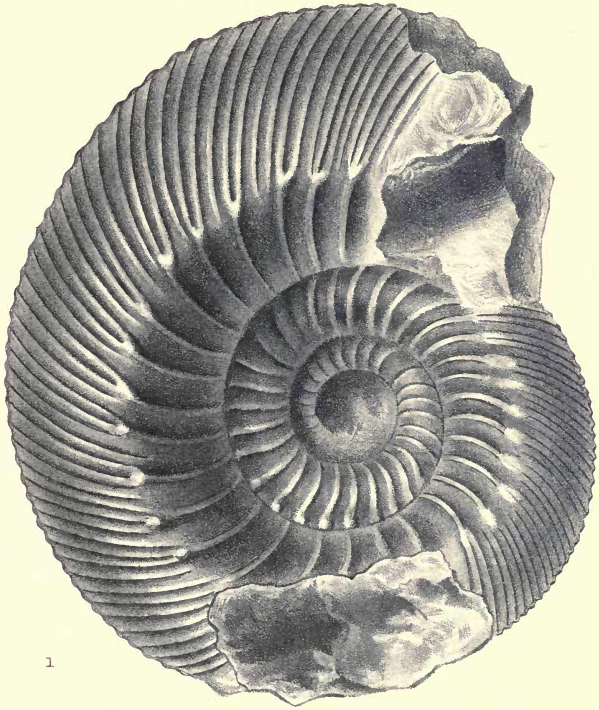
PLATE XXIII.

OLCOSTEPHANUS LOGANIANUS (page 211).

Figure 1. Side view of the most perfect specimen known, from Sigutlat Lake, B.C.

" 1 *a*. Portion of a shell of the same species, from the south side of Alliford Bay.



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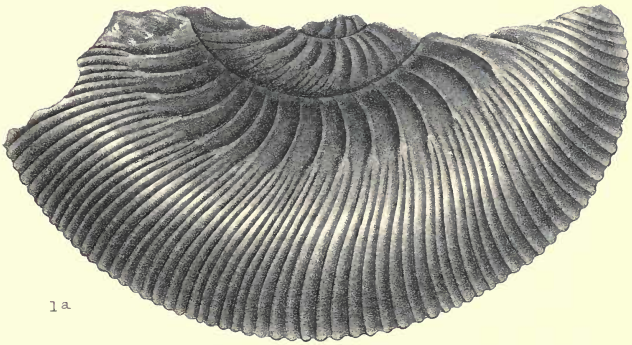

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J.H.Balbirnie Lith.

A. Mortimer Impt

PLATE XXIV.

HAPLOCERAS CUMSHEWAENSE (page 208).

Figure 1. Side view of the type specimen from Cumshewa Inlet.

HAMITES (?) GLABER (page 213).

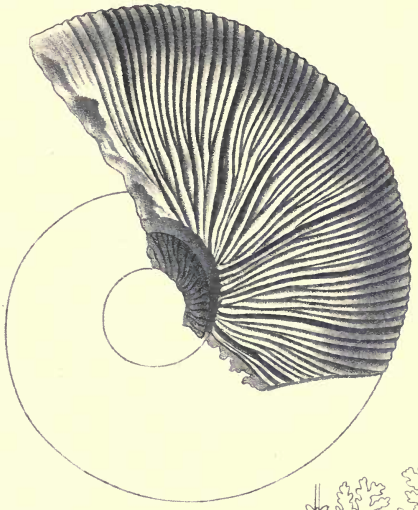
Figure 2. Portion of one of the limbs of this species, which shows two distant oblique constrictions.

" 2 *a*. Another portion of one of the limbs, with only one constriction.

" 2 *c*. Portion of a septum of the same.

" 2 *b*. Specimen showing portions of two of the limbs, one of which is bent closely on the other.

All the specimens figured are from Cumshewa Inlet.



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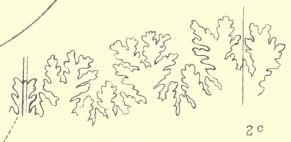

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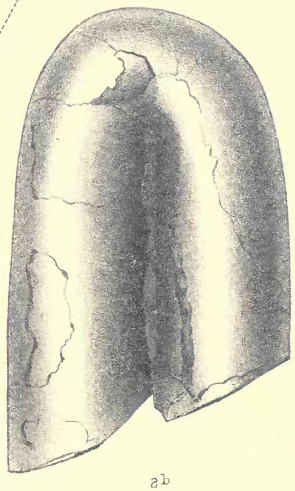

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PLATE XXV.

LYTOCERAS SACYA, Forbes, (page 203).

Side view of one of the best specimens collected by Dr. G. M. Dawson, from Bear Skin Bay, Skidegate Inlet.

L.M.Lambe, del.

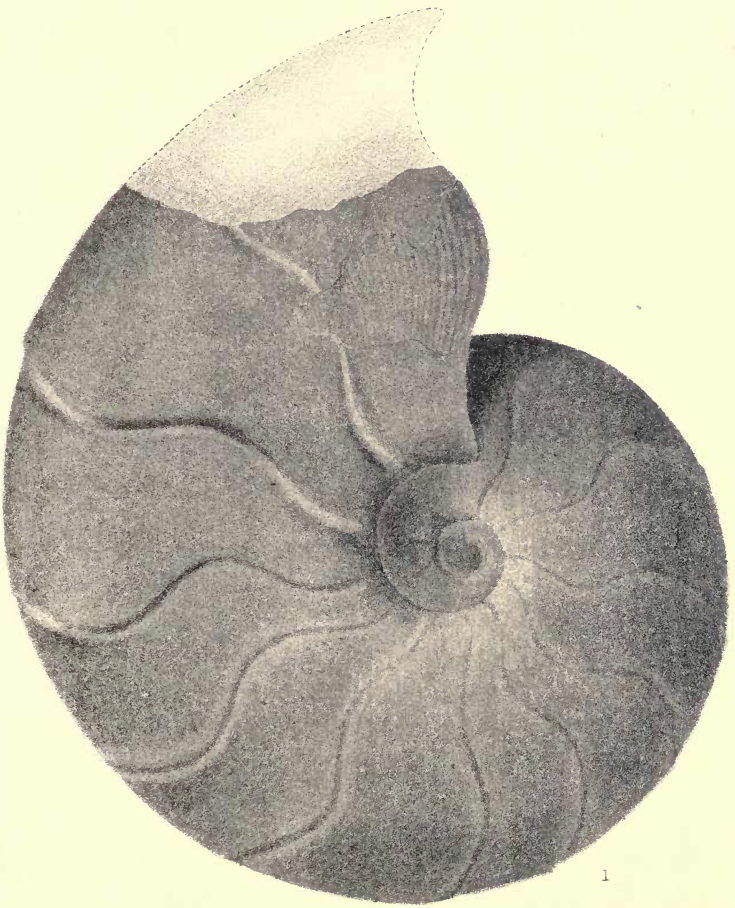
G.E.Desbarats & Co. Lith.

PLATE XXVI.

HAPLOCERAS BEUDANTI, Brongniart, (page 205).

Figure 1. Side view of a specimen from Cumshewa Inlet, with the umbilical margin broadly rounded.

" 1 *a*. Portion of a septum of the same.



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G.E.Desbarats & Co. Lith.

PLATE XXVII.

Lytoceras Batesi, Trask, (page 202).

Figure 1. Side view of a specimen from Bear Skin Bay.

Nerinæa Maudensis (page 214).

Figure 2. A large but imperfect specimen.
" 2 *a*. Magnified view of a portion of the same.
" 2 *b*. A young but very perfect individual.
" 5 *c*. Another immature specimen whose apex is broken off.
" 2 *d*. View of a polished longitudinal section of another specimen to show the characters of the interior of the shell.
All the specimens figured are from the east end of Maud Island.

Cerithium Skidegatense (page 215).

Figure 3. Dorsal view of a specimen from the east end of Maud Island slightly enlarged.
" 3 *a*. Magnified view of the last whorl but one of the same, to show the details of the sculpture.

Vanikoro pulchella (page 215).

Figure 4. Dorsal view of the type specimen from the east end of Maud Island, enlarged about two diameters.
" 4 *a*. Ventral view of the same. to show the aperture and imperforate base.

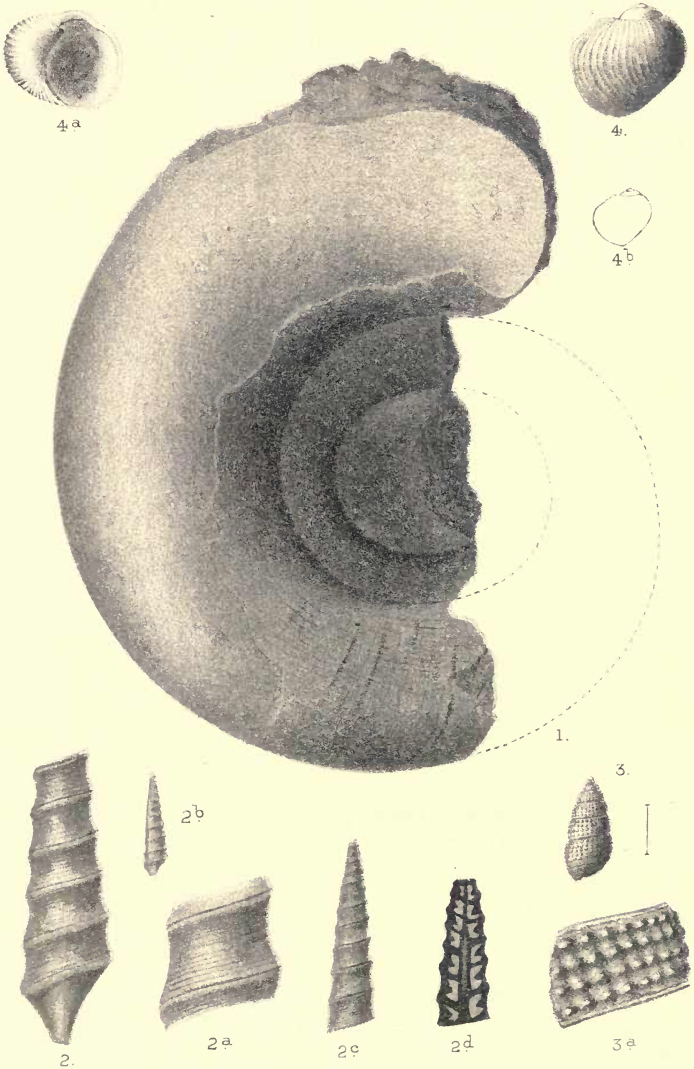
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PLATE XXVIII.

HAPLOCERAS PLANULATUM, Sowerby, (page 207).

Figure 1. Side view of a small specimen from Cumshewa Inlet.

ANCYLOCERAS RÉMONDI, Gabb, (page 212).

Figure 2. Side view of a specimen from Cumshewa Inlet.
" 2 *a*. Outline of a transverse section of the same.

AMAUROPSIS TENUISTRIATA, Whiteaves, (page 216).

Figure 3. Dorsal view of a specimen from Bay east of Alliford Bay.

CALLIOSTOMA CONSTRICTUM (page 217).

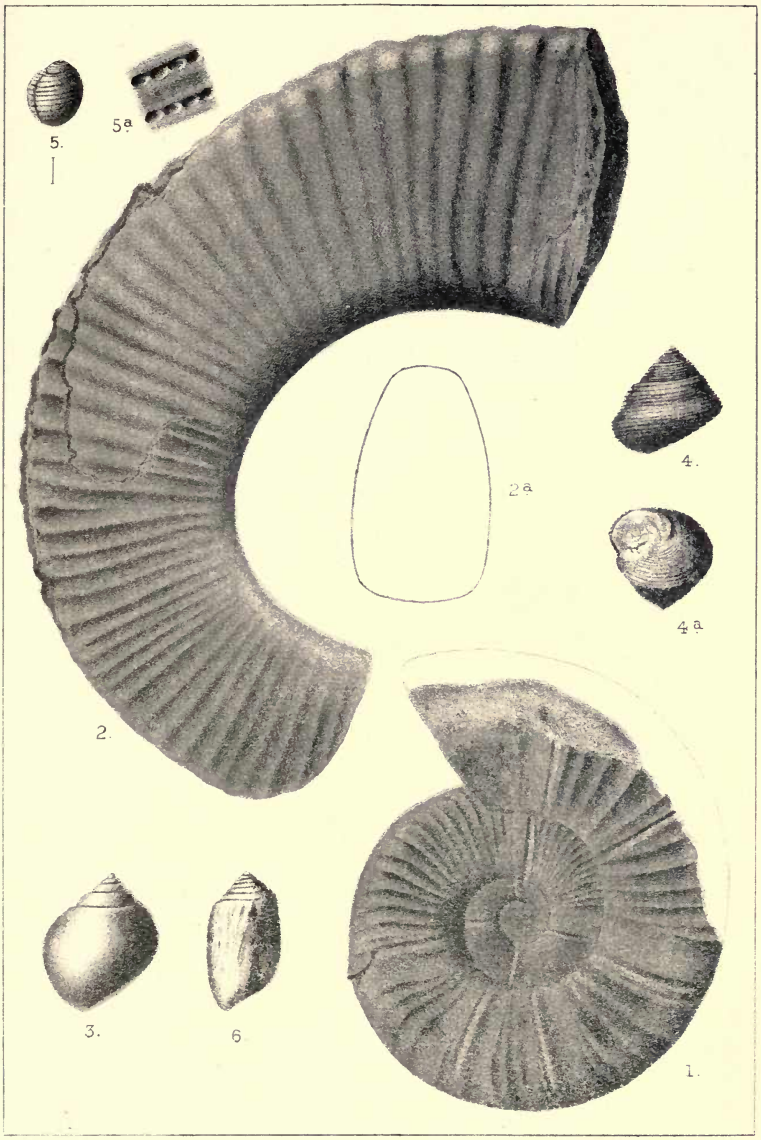
Figure 4. Dorsal view of the type specimen from the east end of Maud Island.
" 4 *a*. Another view of the same to show the imperforate base and shape of the aperture.

CINULIA PUSILLA (page 217).

Figure 5. Magnified view of an adult specimen from South Island.
" 5 *a*. Portion of surface of body-whorl of the same still further enlarged, to show the sculpture.

TROCHACTÆON CYLINDRACEUS, Stoliczka, (page 218).

Figure 6. Dorsal view of an average specimen, from Maud Island.



L.M.Lambe, delt

J.E.Desbarats & Co Lith.

PLATE XXIX.

TEREDO SUCIENSIS (page 218).

Figure 1. Side view of a left valve from Cumshewa Inlet, somewhat enlarged.

MARTESIA CARINIFERA (page 219).

Figure 2. A nearly perfect cast of the interior of this shell, from Bear Skin Bay in Skidegate Inlet.

" 2 *a*. Portion of a mass of the burrows of this species, from the same locality as the last.

CORBULA CONCINNA (page 219).

Figure 3. Exterior of a right valve from the south side of Alliford Bay, considerably magnified.

" 3 *a*. Left valve of the same specimen, also enlarged.

PERIPLOMA CUSPIDATUM (page 220).

Figure 4. View of a specimen from the north side of Maud Island, in which both valves are flattened out.

" 4 *a*. Right valve of another individual from the north side of Maud Island.

" 4 *b*. Left valve of a third specimen from the same locality,

THRACIA SEMIPLANATA (page 221).

Figure 5. Exterior of a right valve from the south side of Alliford Bay.

" 5 *a*. " " left " " " "

" 5 *b*. " " another right valve from the south side of Alliford Bay.

" 5 *c*. Left valve of the same.

PLEUROMYA SUBCOMPRESSA, typical form, (page 222).

Figure 6. A small right valve from the south side of Alliford Bay.

PLEUROMYA SUBCOMPRESSA, var. CARLOTTENSIS, (page 223).

Figure 7. Side view of an imperfect specimen from the south side of Alliford Bay, showing part of the left valve.

" 7 *a*. Side view of another specimen from the same locality, showing most of the right valve.

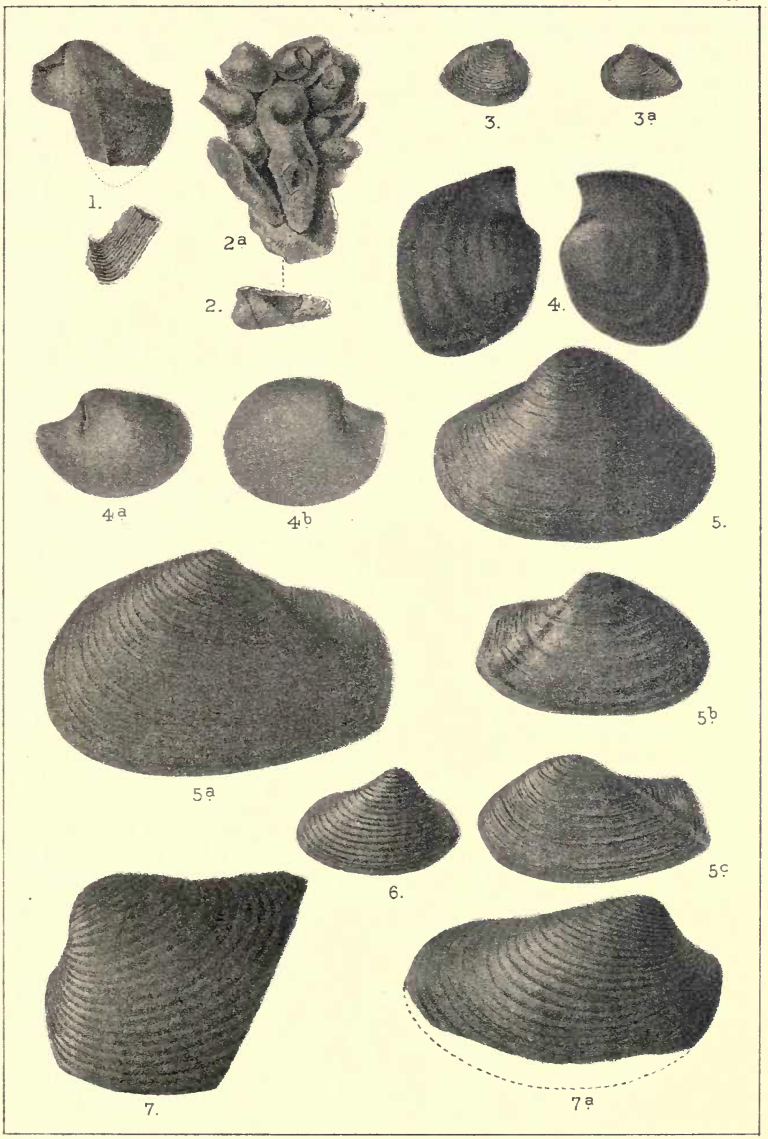

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PLATE XXX.

PLEUROMYA (SUBCOMPRESSA ? var.) LÆVIGATA (page 224).

Figure 1. Side view of a perfect specimen from the south side of Alliford Bay, showing the right valve.

" 1 *a*. The same aspect of another and equally perfect cast from Alliford Bay.

" 1 *c*. Do.

" 1 *b*. Dorsal view of the same specimen as the last, to show the thickness through the valves.

TELLINA SKIDEGATENSIS (page 225).

Figure 2. A left valve which has the whole of the test preserved.

" 2 *a*. Right valve of a cast of the interior of the shell, which shews the muscular impressions and pallial sinus.

" 2 *b*. Side view of another left valve.

All the specimens figured are from Bear Skin Bay, in Skidegate Inlet.

Figure 3. Right valve of a shell from the north side of Maud Island, which may possibly belong to this species.

THETIS AFFINIS (page 226).

Figure 4. View of a perfect cast of the interior of a shell of this species, from Bear Skin Bay, showing the strong double inflection of the pallial line.

" 4 *a*. The same, as seen from above.

" 4 *b*. Cast of a left valve of an ovately subtrigonal specimen, also from Bear Skin Bay.

PROTOCARDIUM HILLANUM, Sowerby, (page 228).

Figure 5. Right valve of a small specimen from the east end of Maud Island, which is supposed to be referable to this species. Slightly enlarged.

ASTARTE PACKARDI, White, (page 229).

Figure 6. Right valve, of large size, from the east side of Alliford Bay.

" 6 *a*. Interior of the same.

" 6 *b*. A smaller specimen from the same locality.

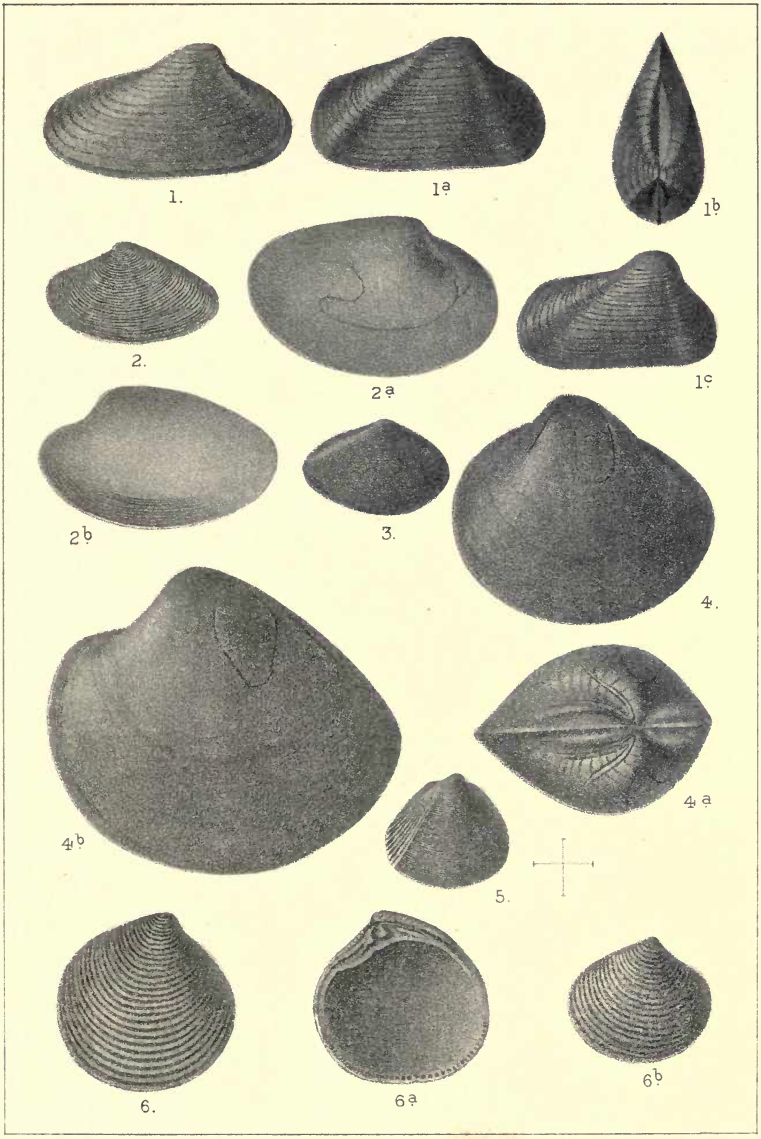
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PLATE XXXI.

TRIGONIA DAWSONI, Whiteaves, (page 231).

Figure 1. Left valve of a specimen from the Iltasyouco River, B.C.

" 1 *a*. Right valve of a specimen from the south side of Alliford Bay.

NOTE.—This species, as stated on page 261, appears to be synonymous with *Trigonia intermedia*, Fahrenkohl.

TRIGONIA MAUDENSIS (page 230).

Figure 2. Side view of a right valve of the most perfect specimen collected by Dr. G. M. Dawson, from the north side of Maud Island.

NUCULA SOLITARIA, Gabb, (page 232).

Figure 3. Side view of a cast of the interior with a small portion of the test remaining, slightly enlarged. From the south side of Alliford Bay.

" 3 *a*. Outline of the same specimen as viewed in front.

YOLDIA ARATA (page 233).

Figure 4. Lateral view of a specimen from South Island, somewhat enlarged, and showing the right valve.

" 4 *a*. Another individual, from the same locality, in which the posterior extremity is more narrowly cuspidate.

NEMODON FISCHERI, d'Orbigny, (page 234).

Figure 5. Side view of a perfect left valve from the east end of Maud Island.

TRIGONOARCA TUMIDA (page 235).

Figure 6. A perfect right valve of this species from the east end of Maud Island.

MYTILUS LANCEOLATUS, J. Sowerby, (page 236).

Figure 7. Lateral view of a cast of the interior, from Shingle Bay, showing the left valve.

Outline of the base of the same specimen.

GRAMMATODON INORNATUS, Meek & Hayden, (page 235).

Figure 8. Side view of a specimen from Cushewa Inlet.

" 8 *a*. " " " the south side of Alliford Bay, in Skidegate Inlet.

" 8 *b*. Do.

OXYTOMA MUCRONATA, Meek, (page 238).

Figure 9. A left valve from the east side of Alliford Bay.

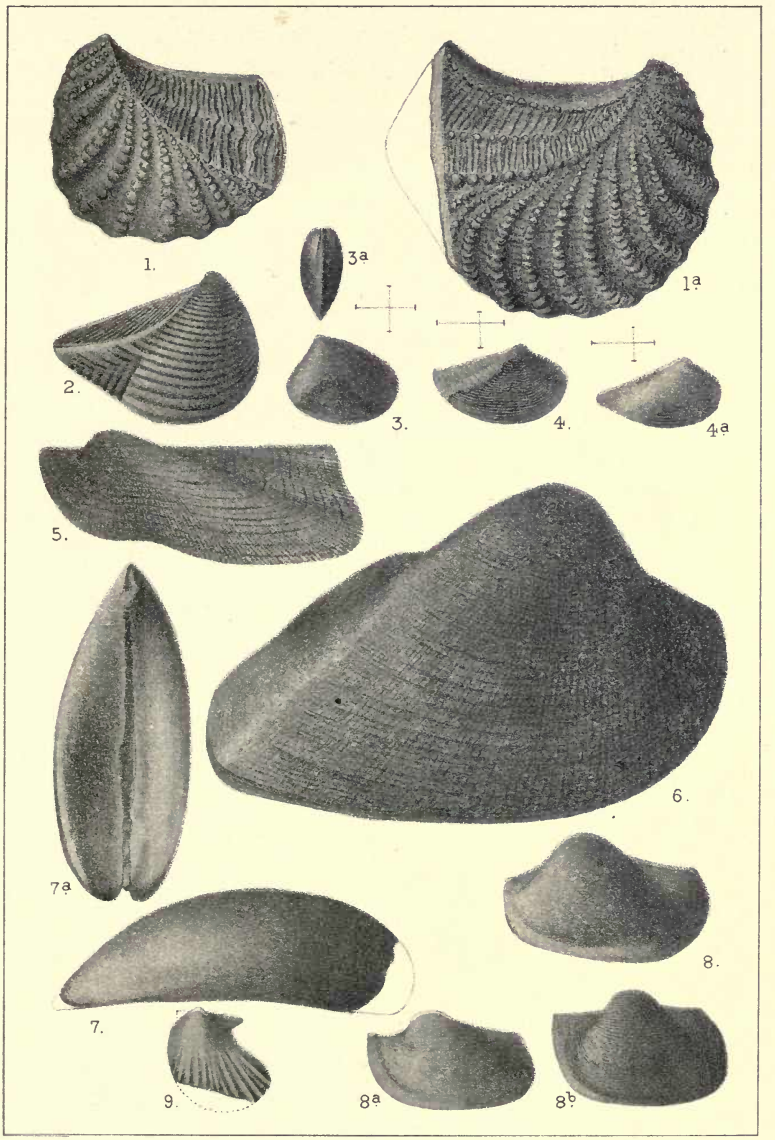
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PLATE XXXII.

Ostrea Skidegatensis (page 243).

Figure 1. A clustered specimen from the south side of Alliford Bay, as viewed from above.

Gryphæa Nebrascensis, Meek & Hayden, (page 244).

Figure 2. Specimen from the south end of Alliford Bay.

" 2 *a*. Another view of the same, to show the smaller and flatter valve.

" 2 *b*. " " " " amount of the convexity of the convex valve and its strongly incurved beak.

Inoceramus (Actinoceramus) sulcatus, Parkinson, (page 241).

Figure 3. Side view of a specimen from Bear Skin Bay Skidegate Inlet, showing the right valve and part of the left.

" 3 *a*. Another view of the same specimen, showing the left valve only.

Camptonectes curvatus, Geinitz, (page 242).

Figure 4. A right or under valve, from the east end of Maud Island.

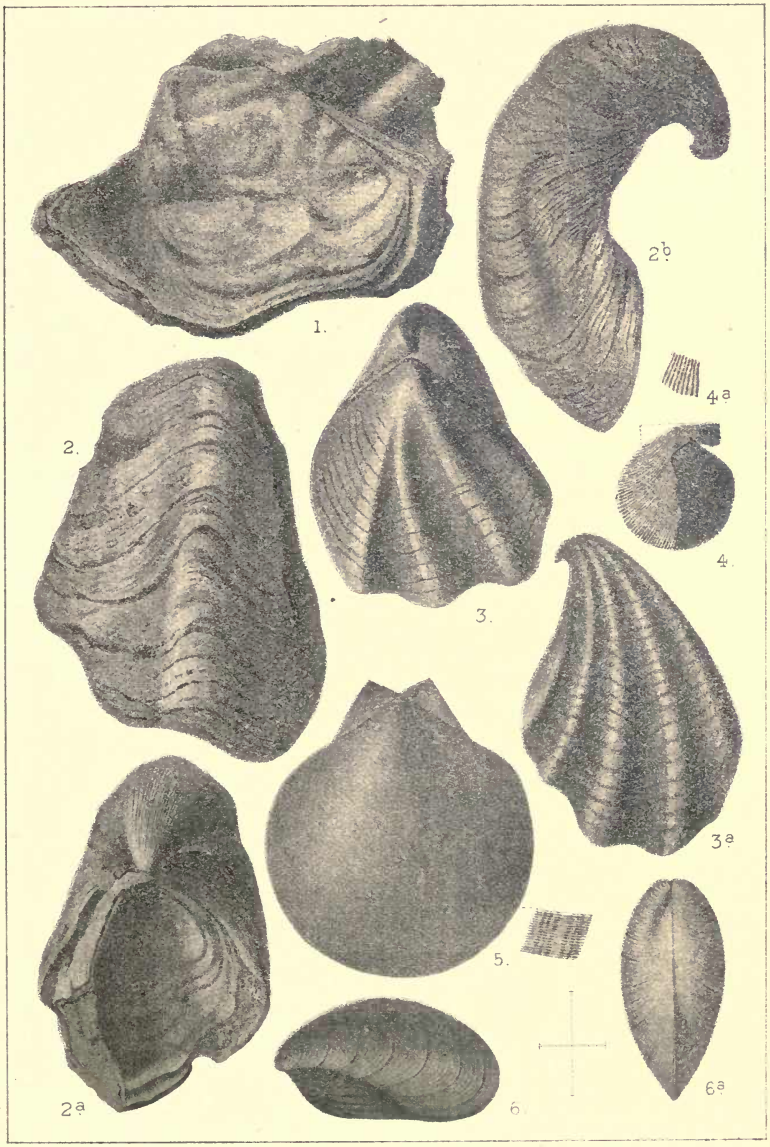
Amusium lenticulare (page 242).

Figure 5. An upper valve from Cumshewa Inlet with both ears well preserved. A portion of the sculpture, magnified, is represented on the right hand side of the lower part of the figure.

Lithodomus Maudensis (page 237).

Figure 6. Side view of a specimen from the east end of Maud Island, somewhat enlarged.

" 6 *a*. Another view of the same, to show the amount of convexity of the closed valves.



L.M.Lambe, del.

G.E Desbarats & Co. Lith.

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